JPRS 79075

28 September 1981

USSR Report

CYBERNETICS, COMPUTERS AND AUTOMATION TECHNOLOGY

No. 57

FBIS FOREIGN BROADCAST INFORMATION SERVICE

JPRS 79075

28 September 1981

USSR REPORT

CYBERNETICS, COMPUTERS AND AUTOMATION TECHNOLOGY

No. 57

CONTENTS

GENERAL

CEMA Cooperation in Computer Development 1

Georgian Scientific Cooperation Discussed. 3

Standardization of Data Banks, Software for Computer Networks Urged. . . 5

New Call for Computer Ministry 6

Glushkov Urges Creation of USSR State Committee for Management Systems . 10

HARDWARE

Minsk Plant Checks Out YeS-1035, YeS-1060 Computers. 12

Computer Anti-Interference Research Nominated for State Prize. 13

Basic Principles of Organization of Decoding Structures for Multipoint Monitoring Systems 15

Speed of Algorithms for Fast Fourier Transforms of Large Arrays. 18

Optoelectronic Device for Coding Line Images 21

Abstracts From the Journal 'AVTOMETRIYA', January-February 1981. 24

New Automatic Telex System Placed in Service 31

Briefs

Electronic Calculator 33
New Display Panel 33
Brest Computing Production 33
Automated Control Systems 34
New Current Meter 34

APPLICATIONS

Pocket Calculator to Compute Radiation Dosage 35

Second Phase of Automated System for State Statistics in Operation. . . . 40

USSR Central Statistical Administration Main Computer Center in the 10th Five-Year Plan 48

Minsk Collective-Use Computer Center Turned Over for Industrial Operation 54

Automated Data Bank for the Belorussian SSR Central Statistical Administration. 58

Problems of Implementing Full Mechanization of Accounting 62

Computers in Instruction. 67

Computers in Higher Education 70

Latvian ASU 73

Computational Linguistics in Estonia. 74

Computers in Rural Construction 76

Use of Automated Systems in Maritime Transportation 78

Academician Viktor Glushkov on State of the Art; Microcomputers 82

Automated Oil Pipeline Transport Control System 87

Briefs
- Computers and Concrete 89
- Missing Parts 89

CEMA COOPERATION IN COMPUTER DEVELOPMENT

Tallinn SOVETSKAYA ESTONIYA in Russian 29 Jul 81 p 3

[Article by V. Petrunya, TASS, Moscow, under the rubric "CEMA in Action": "In a Unified System"]

[Excerpts] Specialists in five CEMA member countries have started development of a unified standard electronic element base for radioelectronic apparatus, communication facilities and computer hardware. This work was envisaged by the intergovernmental agreement signed recently in Sofia at the 35th CEMA session. Creation of this base will allow fuller satisfaction of the demand by the fraternal countries for electronic items with a high technical level.

The decision was also made to develop a program of cooperation aimed at widespread use of microprocessors in the national economy. This technology is of great importance to raising the efficiency of the economy and accelerating scientific and technical progress.

These agreements signify a qualitatively new stage in cooperation between the CEMA member countries in a major socioeconomic sphere--in automation of labor in all spheres of activity of modern society. It is based on the solid experience of the preceding years gained by the countries in the socialist association. It is the development of computers and automated control systems within the bounds of CEMA that is considered one of the strategic directions of the scientific and technical policy of the fraternal states. More than 300,000 specialists and workers who work in more than 80 plants and firms have been drawn into the sphere of cooperation in this field.

In developing electronic computer hardware, the CEMA countries are cooperating on the basis of specialization and sharing of scientific research, design work and production of machines. It is no coincidence that mutual deliveries of computers within CEMA are growing steadily. At the last session of the council, G. I. Marchuk, chairman of the CEMA committee on scientific and technical cooperation, called the creation of the scientific and production base for development and manufacture of computer hardware a truly major result.

CEMA member countries for all practical purposes are now fully meeting their demand for modern computer hardware. They have stopped purchasing it in the capitalist countries and are acquiring single models only in individual cases.

This success is not only of scientific and economic importance. Cooperation in developing and applying computer hardware in the national economy is a major prerequisite to aligning the economic, scientific and technical levels of development of the fraternal countries.

According to the data of the CEMA secretariat, the "Elektronika NTs-80-01" microprocessor computer system has been developed in the USSR. It has a speed up to 550,000 operations per second. This small compact board weighs a total of 300 grams.

8545
CSO: 1863/218

GEORGIAN SCIENTIFIC COOPERATION DISCUSSED

Tbilisi VECHERNIY TBILISI in Russian 4 May 81 p 3

[Interview with I. V. Prangishvili, deputy director of the Institute of Control Problems of the USSR Academy of Sciences and the USSR Ministry of Instrument Making, Automation Equipment and Control Systems, and academician of the Georgian SSR Academy of Sciences, in Tbilisi by G. Levin: "Cooperation and Contacts"; exact date of interview not given]

> [Text] I. V. Prangishvili, deputy director of the Institute of Control Problems of the USSR Academy of Sciences and the USSR Ministry of Instrument Making, Automation equipment and Control Systems, and academician of the Georgian SSR Academy of Sciences, visited Tbilisi the other day. He is a prominent Soviet scientist, a product of the Georgian Polytechnical Institute imeni V. I. Lenin, working in the field of computer technology and control systems. In our country, he guided the development of the new scientific direction associated with the creation of control computers noted for their high speed, operational reliability and efficiency in use. These computers are widely employed in the development of a network of geophysical computing centers that determine deposits of oil and gas and are also used to process the large volume of information coming in from various facilities and surveyors.
>
> I. V. Prangishvili is a pioneer in the development of tele-automatic systems with program control that are widely employed in the country's national economy.

In a conversation with our correspondent, Iveri Varlamovich Prangishvili said: "Our institute maintains creative contacts with many scientific research institutes in Georgia, and above all, with the institutes of the Georgian SSR Academy of Sciences and the republic's Ministry of Higher and Secondary Specialized Education. Various control computer complexes based on PS-300 small computers have been developed and assimilated in industry through the joint efforts of scientists. They are being used extensively in process control in a number of sectors of the country's national economy. Through the efforts of scientists from our institute and Georgian scientific centers in the 10th Five-Year Plan, many other problems have been resolved too that are associated with the development of the national economy, in particular, with the optimization of the process of rolling steel pipe at the Rustavi Metallurgical Plant.

In the 11th Five-Year Plan, joint efforts are planned to develop a new type of computer complex that will be used to solve current problems involving optimization of production control. This is one of the important problems posed to the country's scientists by the decisions of the 26th CPSU Congress. The work will be carried out in collaboration with the scientists and specialists of the institutes of control systems and cybernetics of the Georgian SSR Academy of Sciences, the Tbilisi University, the GPI [Georgian Polytechnical Institute] imeni V. I. Lenin and the "Elva" Scientific Production Association. The system being developed by us will help to efficiently solve problems of optimal control of production processes. In particular, it will have to control processes such as smelting of steel, rolling of pipe and extraction of petroleum and gas. These machines will even be used in medicine to aid physicians in solving problems associated with the study of the blood circulation, the heart, nerve disorders, etc.

With our Georgian colleagues, we are also involved in the problems of elaborating the theory of decision-making in complex situations. It will help directors of scientific centers, ministries and departments apply more rational decisions to specific problems.

In the 11th Five-Year Plan, many other problems concerning development of computer technology will also be solved through the joint efforts of Moscow and Tbilisi scientists."

8545
CSO: 1863/218

STANDARDIZATION OF DATA BANKS, SOFTWARE FOR COMPUTER NETWORKS URGED

Moscow PRAVDA in Russian 16 Jun 81 p 3

[Article by E. Yakubaytis, vice-president of the Latvian SSR Academy of Sciences and director of the Institute of Electronics and Computer Technology, under the rubric "Problems and Judgments": "Computer Networks Are Being Developed"]

[Excerpt] It is clear that the development of modern data banks and information systems is a very important problem, but rather complex too. A number of serious difficulties will have to be overcome to solve it, and chief among them is the development and implementation of a large group of standards defining the rules and procedures for information transmission and processing. This is required to prevent the spread in the country of a large number of different-type data banks, operating with various algorithmic languages and using different methods of interaction with users. After all, in this case, they would turn out to be incompatible with each other and with other networks.

Another problem is psychological reorientation of workers on production and management staffs accustomed to dealing with documents received by mail or telegraph. We have to realize that using modern information systems requires new forms of document turnover too.

And, finally, the value of standardization for computer programs is still underestimated. As a result, many computer centers, design bureaus and institutes are switching to "self-service" for software. A similar tendency has been noted in the development of data banks and information systems. And this is leading to a scattering of efforts and resources. It is time to establish cost accounting enterprises and associations to produce software packages for computers and networks. There is no doubt that the profitability of these enterprises will be high.

In conclusion, I would like to note that development of standard data banks with a ramified network for information teleprocessing is a new direction. There is almost no experience. All the more why it is imperative to speed up development of standard banks to provide the base for training personnel and gain experience.

8545
CSO: 1863/219

NEW CALL FOR COMPUTER MINISTRY

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA in Russian No 4, Apr 81 pp 135-139

[Article by A. R. Myagi, candidate of engineering science and director of the computer center of the PKB [project design bureau] for control systems of the Ministry of Light Industry, Estonian SSR, Tallinn, in the section "Briefly on an Important Matter": "Computer Hardware: Not Pieces, but Complete Sets!"]

[Text] In speaking of successes of ASU's, the quantity of systems introduced is often cited in numbers and the economic effect achieved from introduction of them in rubles. Considerably more rarely analyzed is the technical level of the ASU's introduced, the status of the hardware complexes installed and the intensity of use of the computers. Meanwhile, although the operating computer capacities are a long way from meeting our country's needs, they are not being utilized in the best way and existing statistical reporting does not permit uncovering available reserves.

The overwhelming majority of third-generation computers installed is operating in the single program mode. This means that at least half of the computer capacities is not being utilized. Since state normative provisions for computer loads are not being met either, one has to recognize that on the whole VT [computer hardware] is poorly utilized. It seems to us that this situation has been caused by errors in planning the production and distribution of computer hardware and the design of ASU's as well as by tariffs for computer center services that are less than ideal.

Production and introduction of computers are planned in numbers and operations per second. This is no obstacle to mass production of so-called "base sets of computers" that have only about half of the devices needed for continuous multiprogramming operation of computers. Further upgrading of these computers entails extraordinary difficulties and is practically impossible. Even worse is the situation with ASU equipment for data acquisition, recording and transmission. Production of this equipment is about one-tenth that needed to equip all ASU's developed according to state plans. Here is just one example. In 1979, the first phase of the ASUP [automated enterprise control system] was introduced at the Krengol'mskaya Textile Mill Cotton Combine. All preparatory work was done on time there, the request for proposal and contractor design were coordinated with the designer (GPKI [State Project Design Institute] in Ivanovo), the building was constructed for the computer center, personnel were hired for the ASUP department, and the YeS-1022 computer was installed. According to the design that incorporated the best achievements in designing ASU's for textile enterprises, in addition to the base computer set the following is required for normal system operation: 256K bytes of main memory, 4 NML [magnetic tape storage units], 3 NMD [magnetic disk storage units] with 29M bytes each, 1 ATsPU [alphameric printer], 1 RI-8901 remote data collector, 9 RI-7501 data recorders, 7 RI-7701 recorders and 10 Iskra-534 electronic accounting machines. Of all this, less than half was able to be allotted to the combine by the administration for ASU's of the Ministry of Light Industry during the period 1979 to 1980. Under such conditions, can one expect normal ASUP operation and achievement of the planned effect of 1 million rubles?

Dozens of other enterprises of the USSR Ministry of Light Industry have found themselves in a similar situation. Does the development of that number of ASUP's have to be planned when the ministry is not allocated the necessary number of auxiliary devices and peripherals for them? Why is USSR Gosplan unable to coordinate computer and peripheral production with the plans for development of the ASU's of the union ministries? After all, each inadequately equipped computer and ASU represents millions of rubles of capital investment that are not yielding the planned effect. This is evidently due to the lack of a single all-union department responsible for the production, supply and service of computer hardware, development of software and ASU's and improvement of the mechanism for management of computer centers. The question of establishing such a department has been raised by academician V. M. Gluhskov.

All basic documents defining computer center operation are now drafted in the various organizations and departments and poorly coordinated with each other. Thus, the Regulation on the Socialist State Production Enterprise was disseminated to computer centers on an independent balance, but all personnel, except workers, are grouped with the strictly limited administrative-managerial. It would seem there is a new type of production enterprises, consisting almost wholly of "management staff" that, naturally, "has to be reduced." Therefore, computer center applications to increase strength when order volume increases remain unsatisfied.

Expenses to maintain in-house computer centers for the enterprises are grouped with production expenses and their personnel to production. But if an enterprise orders computer calculations at external computer centers, it has to pay for the machine time out of the limited allocations for maintaining the management staff. It turns out to be easier for an enterprise to establish its own computer center than to use the services of external computer centers, including collective-use centers, which clearly contradicts state policy in this area.

Statistical information on computer operation is gathered on the hopelessly obsolete form No. 1--mekhschet [mechanized calculation] of the USSR TsSU [Central Statistical Administration]. The sole indicator describing the time intensity of computer use is the number of machine hours of useful time completed. The "useful time" indicator itself is defined as the time spent on execution and debugging of programs; therefore, it is unclear whether this includes time for system input and output of data, initial loading, set up of magnetic disks and tapes, waiting for an operator's response, etc.

It seems to us that useful time has to be considered that time in the course of which any computer system device is engaged with input-output, exchange or processing of data, including the time during which any task is in main memory and awaiting operator action. All indicators associated with computer operation accounting have to be stipulated by a state standard (GOST) and the accounting of them automated. For this, YeS computer operating systems have to be supplemented with common facilities for accounting of the computer load and maintaining accounts with users.

Accounting for computer use time is done in a log manually maintained by operators. It is clear that it is inaccurate, but the "mistakes" always lead to an increase in useful time. It is impossible to determine the main thing from form No. 1-mechanized calculation: was the computer operating in the single or multiprogram mode, what amount of information was processed in symbols, how much time was the most important computer device—the central processor--in operation? The form contains no economic data at all.

Moreover, in the multiprogram mode, it is fundamentally impossible to determine the duration of execution of any individual job in hours of useful machine time, and consequently, it is impossible to obtain data on how many hours of useful machine time were spent during the reporting period to solve individual groups of problems.

In the multiprogram mode, only the time for execution of jobs can be determined. We suggest this indicator be considered as the time from job initialization to completion plus the time for system input and output of data for this job, if system input is performed prior to job intialization and system output after completion (which, for example, is the case in the YeS OS operating system).

State norms for average daily computer load are established in hours of useful machine time, just as the tariffs for computer use. It follows that it is economically inexpedient to operate the computer center in the multiprogram mode. After all, it is easier to meet the state norm for average daily computer load in the single program mode, and the size of the bonus for the computer center workers depends on this. In the multiprogramming mode, computer center expenditures for the reporting period are increased, while receipts, in accordance with the price list in effect, do not change.

It is interesting to note that in the GDR [German Democratic Republic], normative coefficients of multiprogrammability have been established within the range of 1.4 to 1.83 as a function of computer type, in addition to the norms for average daily load in hours of useful time. These two norms can be replaced by a norm for average daily computer load in hours of execution of jobs. Tariffs for computer use are also established per hour of execution of jobs. The amount of time completed in all computer centers is defined by programs common to all YeS computers which ensures validity of accounting.

It seems to us that it is expedient to use rates per hour of execution of jobs as a transitional stage to development of rates per quantity of characters processed, which is still troublesome because of the complexity of automating the corresponding accounting.

Conclusions on the need for the following measures can be made based on what has been discussed above:

-- Improve the completeness of the computer set. For this, put enhanced requirements in the state standard for making up the set and if necessary temporarily reduce the number of computers being produced.

-- Balance the plans for ASU development and the production of computers, auxiliary equipment and peripherals. If necessary, reduce the number of ASU's being developed, after ensuring the complete equipping of them strictly by design.

-- Implement the suggestion by academician V. M. Glushkov on organization of a single unionwide department for production and service of computer hardware, software and ASU's; make this department responsible for development of all norms and tariffs; and subordinate all major territorial collective-use computer centers to it.

-- Develop a state standard for indicators associated with accounting for computer use; include in computer operating systems facilities for automatic accounting of these indicators, including facilities for determining the cost of work performed.

-- It is advisable to establish a state norm for the average daily computer load in hours of execution of jobs.

-- Abolish the procedure of enterprises and organizations financing calculation work in external computer centers at the expense of limited allocations for maintenance of the managerial staff.

-- Completely replace form No. 1-mechanized calculations.

COPYRIGHT: Izdatel'stvo "Nauka", "Ekonomika i organizatsiya promyshlennogo proizvodstva", 1981

8545
CSO: 1863/212

GLUSHKOV URGES CREATION OF USSR STATE COMMITTEE FOR MANAGEMENT SYSTEMS

Moscow PRAVDA in Russian 30 Jun 81 p 2

[Article by V. Glushkov, academician, hero of socialist labor, Kiev, under the rubric "Intensification: Essence, Ways and Means": "Technological Problems of Management"]

[Excerpts] Unfortunately, the practice of using computers in planning and management still bears the imprints of "technicism." And yet the main feature in automating organizational processes is not the installation of the computer and wires throughout enterprises, but changing the very information basis and converting document turnover to machine media. This involves changing the form of documents and organizational structures and personnel composition and switching to engineering design of management procedures and the very work places. Using a computer means switching to man-machine methods of working out and realizing solutions in the interactive mode, and not shifting the usual to machines. It is not possible to organically include a computer in a system of organizational and economic mechanism without new forms of documents, improving work style, refining legal norms, etc. This is all the more important considering that in this five-year plan enterprises will be more and more acquiring ASU's and sharply increasing contingents of system developers.

Life is dictating the necessity of establishing a special state-wide service to achieve consolidation of efforts on rationalization of management at all levels. Actually, there is such a service, but it is decentralized and splintered. On the staffs of ministries and departments, there are administrations and departments charged with modernization of organizational processes and direction of computer centers, scientific research institutes and special design bureaus for development and implementation of ASU's and computers. No few specialists are engaged in them. These elements and services must be centralized and methodological unity achieved in their actions. It is time to consider the question of forming a state agency to comprehensively improve the technology of planning and management based on computers.

The need for this is also dictated by the fact that a unified state system of computer centers (GSVTs) is forming in the country. This is a major instrument of interdepartmental interaction, but it has no single "boss." If the elements of the GSVTs are "distributed" to the ministries and departments, it will cease to be unified and state-wide. The owner of the GSVTs must be, in my opinion, a Goskomupr [USSR State Committee for Management Systems]. It could not manage without the scientific research institutes, the design institutes and the SKTB [special technological design bureaus]. But it would be the sole customer for computers for the producers of them.

And more. The network for training and retraining managerial personnel for the various levels in the country is not in good order and is managed by the various departments. It should also be concentrated in one agency, as was done, for example, in the training and retraining of party cadres. It would be advisable to place an academy of the national economy and institutes for retraining managerial personnel under a USSR Goskomupr.

I will note that the ramified "system" of a future state committee need not be created all over again, diverting additional resources for these purposes. It basically exists already. It is a question of resubordination of a number of scientific research institutes, VUZ's and SKTB's that are managed by the ministries. Naturally, the specific functions of a state committee, its structure and forms of interaction with other agencies and departments in the country need to be defined more precisely.

8545
CSO: 1863/219

MINSK PLANT CHECKS OUT YES-1035, YES-1060 COMPUTERS

Minsk SOVETSKAYA BELORUSSIYA in Russian 12 Mar 81 p 2

[Article by G. Kotov: "Computers Pass Test"]

[Excerpts] Work is in full swing in system debugging section 12, headed by communist Ivan Vasil'yevich Lipsk. Three new YeS-1035 computers are being turned over for delivery. Here, just as in other similar sections of output shop No. 103, is where the conveyor of the Minsk Computer Production Association terminates. Hundreds of machine components on which thousands of workers have labored arrive here from all the subdivisions.

Sharpness of wit and application of progressive technology has allowed reducing the check-out period by 12 days.

And next to the 103d shop is another similar output shop, the 133d. YeS-1060 computers are sent out from here.

Minsk workers have decided to increase production by eight percent this year.

The sales department told me that the computers put out that day were sent to Moscow, Novosibirsk, Perm', L'vov.... Three YeS-1035's to the GDR [German Democratic republic], two to Cuba, one to Hungary...

8545
CSO: 1863/219

COMPUTER ANTI-INTERFERENCE RESEARCH NOMINATED FOR STATE PRIZE

Vilnius SOVETSKAYA LITVA in Russian 9 Jul 81 p 2

[Article by A. Knyazev, chairman of the scientific and technical section of the Moscow City and Moscow Oblast boards of administration of the NTO [Scientific and Technical Society] of Radioelectronics and Communication, under the rubric "For the Competition of the Lithuanian SSR State Prize": "Computers--High Reliability"]

[Excerpt] Computers are being used more and more extensively. However, the matter is complicated to a certain extent by the fact that these machines have a peculiar enemy--electromagnetic interference unintentionally created by numerous and diverse sources of industrial origin. They are called "industrial." It was found that this interference leads to serious malfunctions in the operation of computers. What is more, the potential danger of this interference is increasing.

As a rule, computers are supplied from the common power network. This network also supplies electric motors, monitoring and control instruments, lights and a host of other devices. Almost all of them create interference. The reasons it occurs as well as the ways it gets into computers are varied. For illustration, let us note just one, but rather ponderable, cause. Each time the electric drives, for example, in a mechanical shop are turned on or off, there is a pulse drop ("dip") in the voltage of the power network, or, conversely, a surge ("peak"). It was found that the higher the power of the consumer, the more substantial are the dips and surges. They have an effect on computers like pulse interference.

It was also found that even a computer itself is a source of interference that can disrupt the operation of other radioelectronic equipment (radio receivers, televisions and electronic equipment). On the whole, as computers have evolved, the complex problem of maintaining normal operation of them together with other electrical, radioelectronic and electronic equipment has arisen.

Proper recognition should be given to the scientific foresight of the scientists and specialists of the Vilnius SKB [Special Design Bureau] for Computers who have shown creative initiative in studying the problem of achieving electromagnetic compatibility of computers, including in developing methods of protecting them from various types of interference. Upon this bureau's initiative, a republic scientific and technical conference on "Interference in Digital Equipment" was held in Vilnius in 1969; the conference discussed the fundamental problems of the interference effect on computers and outlined ways of countering it. Subsequent achievements in this field were discussed at two all-union (1971 and 1974) and the second republic (1978) conferences held in the capital of the Lithuanian SSR.

To scientifically substantiate so-called anti-interference methods, one has to know how to measure the interference and analyze its characteristics. Unfortunately, this could not be done properly with general-purpose instruments. In connection with this, for the first time in our country, the SKB collective developed a special set of instruments (a first, and then a second generation) to measure interference and interference-killing features of computers. Appropriate measuring techniques were also developed at the same time. These instruments and techniques are now known to many enterprises and organizations. Knowledge of the electromagnetic conditions for operation of digital computers allows raising the efficiency of their use. In this is the great national economic value of the work performed by the SKB VM [Special Computer Design Bureau] in the field of measuring technology.

An even more important effort by this same collective is the research program aimed at enhancing the computer anti-inference features and reducing the level of interference created by the computers themselves. The research results were incorporated in the computer complexes and other items produced by the "Sigma" Production Association. As a result, the interference-killing features were enhanced tenfold for a number of complexes.

The know-how of the Vilnius Special Computer Design Bureau was published in the technical guides by Minpribor [Ministry of Instrument Making, Automation Equipment and Control Systems]. Since 1973, their basic provisions have been included in the technical specifications for development of new computers and, accordingly, in the technical specifications for a number of items produced by Minpribor enterprises. All this is an effective means of improving the quality of computers and raising the efficiency of their use under actual operating conditions. But it is very important that the state planning organizations determine a manufacturer of the measuring instruments developed by the Vilnius Special Computer Design Bureau, because the series production of them is extremely necessary to support normal operation not only of future, but also of existing digital computers.

In conclusion, we wish to emphasize once more that the research program performed in the SKB during the period 1968 to 1980 under the direction of I. Gurvich, candidate of engineering science, with the creative participation of B. Korneyev, K. A. Ventsyus and V. Samuytis, is of great scientific and national economic importance. And it seems very proper to us to submit this program for competition for the Lithuanian SSR State Prize in the field of science.

8545
CSO: 1863/219

UDC 681.327(088.8)

BASIC PRINCIPLES OF ORGANIZATION OF DECODING STRUCTURES FOR MULTIPOINT MONITORING SYSTEMS

Novosibirsk AVTOMETRIYA in Russian No 2, Mar-Apr 81 (manuscript received 3 May 79) pp 59-65

[Article by V. K. Tereshchenko, Novosibirsk]

[Excerpts] Introduction. The evolution of production of complex digital systems is automatically shaping new demands for means to monitor these systems, since the process of testing and the manual method of selecting checkpoints from a very large number of them are now becoming inefficient. In connection with this, to automate monitoring of such systems, various automated and semiautomated monitoring methods and special assemblies, stands and monitoring systems to support them are being developed. The problem of controlling the processes of monitoring the electronic apparatus of complex systems, as a rule, is now solved by using micro- or minicomputers and the bus-modular principle of organization of the apparatus of these monitoring systems can now be considered established [1].

Discussed in this article are the basic principles of logic organization of multibranch heirarchic decoding structures (MIDS) used as a switch base in specialized systems for multipoint monitoring. The use of MIDS for this function is based on the capability of associative alpha or alphameric addressing of points for mintoring a complex electronic object [2].

General Description of MIDS. MIDS is a special type of decoder, realized by hardware, adapted for operation with nonbinary input information, but synthesized on the basis of traditional binary logic elements, i.e. some multivalue recognizing structure. From the viewpoint of the traditional theory of automata, a MIDS may be both a multicycle (series) and a combination logic recognizing circuit. The basis of any MIDS is a pyramidal decoder with a branching factor of $m > 2$. It is a nonbinary (multibranch) heirarchy of dual-entry AND circuits (IDK), i.e. a recognition tree, realized by hardware, that we shall subsequently call the decoding hierarchy.

Compared to traditional decoders, MIDS have more abundant recognition logic and in connection with this, in the general case, they have in their composition the following functional parts [3-8]: input storage (according to now established terminology --the pre-collection area [pamyat' prednabora]), rearrangement storage, decoding heirarchy and output storage.

The first of the works that marked the start of the theoretical grounding and practical engineering development of hardware MIDS should apparently be considered the work of Gutenmakher [3]. Subsequent scientific and technical development on the subject of MIDS evolved thanks to the achievements in the field of creating a new element base for electronic discrete technology and especially thanks to the development of microelectronics. The main fundamental problems of analysis and synthesis of several types of MIDS have now been resolved at the structural level, and comprehensive engineering developments of several types of them have been made [3-8]. At the same time, a whole concept of the structural features and functional capabilities of all the circuits in this class has now taken shape, and they can be classified by the most important classification features.

Conclusions

1. MIDS are suitable for classification recognition of any information objects (with any set and combination of classification features) by both the series and the combination principle. The only limiting requirement in this MIDS application is the requirement for the specific, stringently adopted, priority-ring arrangement of object features in the input word. Using MIDS in this simplest case presupposes that: a) the number of symbols of the input alphabet reflects the maximum possible number of degrees of gradation of the search (classification) features; b) the number of symbols in the word being decoded equals the number of search features of the given object; and c) each MIDS output line in the excited state means that one specific object has been identified and identifies the address of a link only with this object.

2. With a more general approach to the application of the MIDS for the purposes of associative-classification recognition of objects, it is appropriate to speak of the following universal characteristics of the process of recognition-retrieval of information:

the number of symbols of the input alphabet may be less than the maximum required number of gradations of the search (classification) features; then the maximum required number of gradations is provided by two-, three- or multisymbol combinations;

the number of symbols in the word being decoded may be greater than the number of classification priority-arranged features; then one classification feature in the word corresponds to a multisymbol combination (a section of the input word) and in the MIDS decoding heirarchy, one classification feature with a greater number of degrees of gradation is decoded not by one, but several levels of the heirarchy;

any degree of precision of the classification separation of the search arrays may be established and associated with a MIDS depth by the number of degrees of its decoding heirarchy or the number of analyzed classification features irrespective of how they are reflected in the input word: by one symbol or by multisymbols. In other words, the search pattern on the basis of analysis of its component classification features may be decoded with a precision up to several objects on the MIDS output line, leaving thereby some degree of uncertainty.

3. Using the MIDS in multipoint monitoring systems is a simple and efficient hardware solution to the problem operation communication with the monitoring system in a language of near-natural identifying words which determines the ease of mastering this monitoring system.

BIBLIOGRAPHY

1. Demidov, G. A.; Kiseleva, G. I.; Kozin, G. A.; and Polyudova, A. M., "Automated Tensiometric System of Measuring Based on the 'Elektronika-100' Computer," AVTOMETRIYA, No 2, 1978.

2. Cherepanov, V. G., "Programmirovaniye v kodakh EVM 'Elektronika-S50" [Programming in "Elektronika-S50" Computer Codes], Krasnoyarsk, izd. KPI, 1976.

3. Gutenmakher, L. I., "Device for Selecting Information by Specified Words (Automatic Dictionary)," Author's certificate No 122639, BI, No 18, 1959.

4. Tereshchenko, V. K., "Multicycle Decoding Cell," Author's certificate No 387359, BI, No 27, 1973.

5. Tereshchenko, V. K., "Semimatrix for Multicycle Decoding," Author's certificate No 402866, BI, No 42, 1973.

6. Tereshchenko, V. K. and Pupkov, V. N., "Series Decoder," Author's certificate No 705442, BI, No 47, 1979.

7. Tereshchenko, V. K., "Series Decoder," Author's certificate No 734665, BI, No 18, 1980.

8. Tereshchenko, V. K., "Parallel Decoder," Author's certificate No 658554, BI, No 15, 1979.

9. Drobyshev, Yu. P. and Tereshchenko, V. K., "Prospects for Application of Heirarchic Decoding Structures" in the book "Organizatsiya vychislitel'nogo protsessa v krupnom VTs" [Organization of the Computing Process in a Major Computer Center], Novosibirsk, izd. VTs SO AN SSSR, 1978.

10. Baranov, S. I., "Sintez mikroprogrammnykh avtomatov (graf-skhemy i avtomaty)" [Synthesis of Microprogrammed Automata (Graph-Schemes and Automata)], 2d ed., revised and enlarged, Leningrad, Energiya, 1979.

11. Chirkov, M. K., "Osnovy obshchey teorii konechnykh avtomatov" [Fundamentals of the General Theory of Finite Automata], Leningrad, izd. LGU, 1975.

COPYRIGHT: Izdatel'stvo "Nauka", "Avtometriya", 1981

8545
CSO: 1863/196

UDC 681.32

SPEED OF ALGORITHMS FOR FAST FOURIER TRANSFORMS OF LARGE ARRAYS

Novosibirsk AVTOMETRIYA in Russian No 2, Mar-Apr 81 (manuscript received 28 Aug 78) pp 95-96

[Article by G. P. Lichko, Minsk]

[Text] A two-dimensional discrete Fourier transform (DPF) of the form

$$F(i,k)=\sum_{m=0}^{M-1}\sum_{n=0}^{N-1} f(m,n)\exp\left[-j2\pi\left(\frac{im}{M}+\frac{kn}{N}\right)\right], \qquad (1)$$

which is efficiently realizable by using a fast Fourier transform (BPF) [FFT] is widely used in calculating antenna radiation patterns and antenna system flaw detection by measurements in the near zone.

One of the reasons leading to the undesirable limitation of processable arrays of the results of measurements of the amplitude-phasal distribution of the field in antenna measurements is the sharp increase in FFT processing time as a consequence of exceeding computer main storage (OZU) capacity and using external storage (VZU). Storing the matrix f(m, n) in external storage leads to the necessity of selecting a matrix of intermediate results when performing the transform (1) by columns, which causes difficulty due to the lack of external storage with random access.

There are now several algorithms for fast transposition of matrices stored in external storage based on minimizing the number of readouts of the source matrix from the external storage. The lack of experimental data on assessing the speed of these algorithms for the YeS computer systems impedes the exploitation of them and prevents selecting the most optimal of them. The use of computers with different speed and capacity of main and external storage superimposes limitations on the use of the transposition algorithms and in some cases has a substantial effect on the evaluation of them.

This report is aimed at presenting the experimental assessments of the speed of the main algorithms for FFT of large arrays obtained for the YeS-1020 and YeS-1022 computers.

The experimental results are shown for the algorithms for transposing matrices with the dimensions $2^n * 2^n$ using external storage with direct access as that most suitable to the problem of computation (1) from the viewpoint of speed. The transposition algorithms used are the algorithms of Khant [1], Eklund [2] and Ekstrom [3].

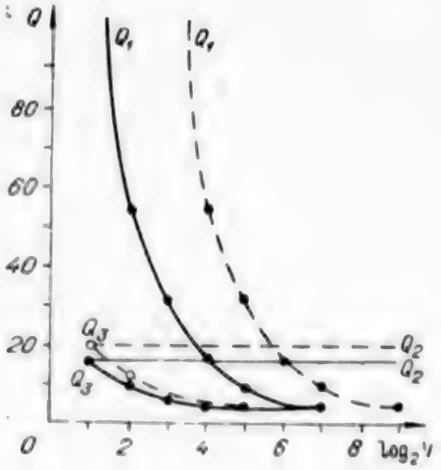
Onoe's algorithm [4] for FFT of large arrays without transposition of matrices of intermediate results is not considered in the work since this algorithm is applicable only to arrays with the dimension N = V^Q, where Q is the number of read-write cycles for the matrix being processed in external storage, and V is the capacity of main storage in rows.

When V rows are stored in main storage, the number of reads and writes of the processed matrix to external storage for the algorithms of Khant, Eklund and Ekstrom will equal respectively

$$Q_1 = 2^n/V + 2, \quad Q_2 = 2n, \quad Q_3 = 2[n/J], \tag{2}$$

where $2^J \leqslant V$, and [] denotes rounding to the nearest integer.

Shown in the drawing is Q_i, i = 1, 2, 3 as a function of $\log_2 V$ derived for n = 8 and n = 10, which makes it possible to theoretically select an algorithm for FFT of a matrix proceeding from main storage capacity. In the case of equality of Q_i, processor operating time needed for transposition in main storage is taken into account. In the process, according to efficiency, the algorithms are ranked the following way: algorithms of Khant, Ekstrom and Eklund.



To rate the speed of the algorithms [1-3], Fortran IV programs were written for the YeS-1020 and YeS-1022 computers with 128 and 512K bytes of main storage respectively, with external storage units YeS-5010, YeS-5010-01, YeS-5052 and YeS-5061 and the control units YeS-5511, YeS-5517, YeS-5551 and YeS-5561. The derived test results are shown in the table. To effect the FFT, the HARM program from the library of standard YeS computer programs was used. To illustrate the efficiency of the algorithms in question, data obtained for external storage with direct and sequential access without use of fast transposition algorithms are shown in the table.

Based on the studies, the following conclusions were made:
it is inexpedient to use sequential access storage for FFT;
in the case of limited main storage, the Ekstrom algorithm is most efficient;
with equal Q_i, the Khant algorithm that effects matrix transposition in main storage by parts is preferred;
a further increase in the speed of the Ekstrom algorithm is possible by increasing the speed of the FFT which takes up more than 60 percent of the total computer operating time.

	Array					
	256 * 256			1024 * 1024		
Algorithm	Computing Time	V	Q	Computing Time	V	Q
FFT with magnetic tape	12^h44^m	2^1	-	200^h	2^1	-
FFT with disk without use of fast algorithms	5^h30^m	2^1	2^9	21^h10^m	2^1	2^{21}
Khant [1]	38^m	2^5	$2^3 + 2$	4^h25^m	2^5	$2^5 + 2$
Eklund [2]	43^m	2^1	2^4	$3^h\ 7^m$	2^1	$2^4 + 4$
Ekstrom [3]	31^m	2^4	2^2	2^h	2^5	2^2
Computer Type:	YeS-1020			YeS-1022		

BIBLIOGRAPHY

1. Khant, B. R., "Structure of Data and Organization of Computations for Digital Enhancement of Images," TIIER, Vol 60, No 7, 1972.

2. Eklund, J. O., "A Fast Computer Method for Matrix Transposing," IEEE TRANS. COMPUTERS, Vol C-21, N 7, 1972.

3. Twogood, R. E. and Ekstrom, M. P., "An Extension of Eklund's Matrix Transposition Algorithm and Its Application in Digital Image Processing," IEEE TRANS. COMPUTERS, Vol C-25, N 9, 1976.

4. Onoe, M., "Method of Two-Dimensional Transformation without Transposition of a Large Matrix of Data," TIIER, Vol 63, No 1, 1975.

COPYRIGHT: Izdatel'stvo "Nauka", "Avtometriya", 1981

8545
CSO: 1863/196

UDC 621.391.156

OPTOELECTRONIC DEVICE FOR CODING LINE IMAGES

Novosibirsk AVTOMETRIYA in Russian No 2, Mar-Apr 81 (manuscript received 1 Aug 79) pp 113-114

[Article by A. S. Blok, V. R. Boronin, V. I. Lebedev, E. I. Krupnitskiy and V. V. Kulikov, Leningrad]

[Text] In developing systems for automatic analysis of line images (analysis of graphics, recognition of handwritten characters, processing of partical track images, etc.), the necessity arises of eliminating the redundancy in the image to be analyzed, specified in the form of the two-dimensional function f(x, y). As a result of eliminating the redundancy, i.e. coding the source image, a description of it is formed, and the set of features making up the description must have sufficient informativeness to solve the specific problem of analysis.

One way of forming the description is to determine the number of intersections of lines, forming the line image, with some system of contour coders. In choosing the geometry of contour coders, two basic approaches are used. The first approach is heuristic and involves visual analysis of the images to be processed. Contour coders are specified so that they provide determination of the number of lines of the source image located between characteristic points or in characteristic regions. This method of forming the description is known as the probe method [1]. The second approach involves using random contour coders. Line intersections of the image under analysis with such contours are random geometric events. The method of forming the description, based on analysis of random geomteric events, is called the method of integral geometry [2].

This description may be formed by using television scanning systems and TsVM [digital computers]. However, in the first case, very complex scanners may be required, while using a computer often leads to solutions unacceptable from the viewpoint of speed or economically inexpedient.

Discussed in this work is a multichannel optoelectronic device, in each channel of which is calculated the number of intersections of one of the contour coders with the lines forming a line image with one of the specified set of contour coders.

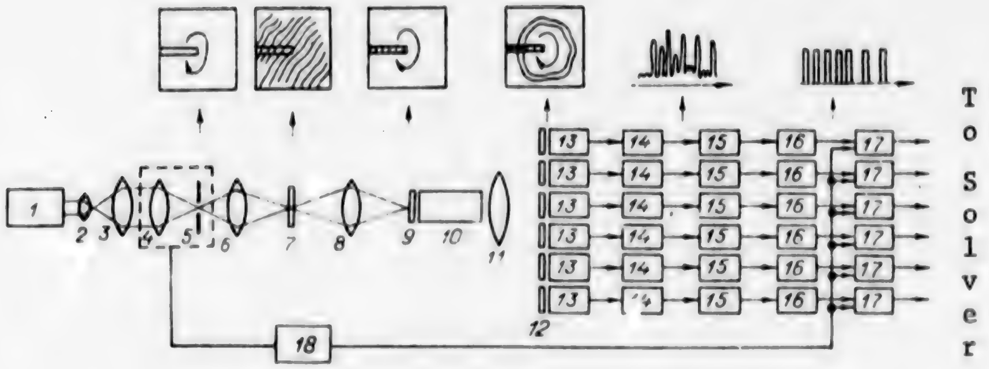


Fig. 1. Diagram of multichannel optoelectronic device for coding line images

A diagram of the device is shown in fig. 1. A beam of coherent light obtained from a laser (1) is expanded by using a collimator (2, 3) and enters the unit for forming the scanning light beam. The unit for forming the scanning beam shown in the drawing is the "rotating line" type. It consists of a cylindrical lens (4) and a micrometric slit (5) positioned at the focus of the lens. The lens and slit are set in a mounting that provides rotation at a constant angular rate. The objective lens (6) transmits the "rotating line" image to the surface of the transparency (7) with the line image being analyzed. At each moment of time, the scanning light beam modulates a section of the image being analyzed, defined by the corresponding angular position of the scanning beam.

The light distribution on the shadow side of the transparency (7) is transmitted by the objective lens (8) to the diffuser (9) located in the aperture of the multiplier consisting of an optical tunnel (10) and a wide-angle lens (11). Installed in the multiplier output plane are optical mask coders (12). A specific contour coder is recorded on each mask. The transmission factor equals one at points located at the limits of the width of the line forming the contour coder and zero at all other points.

The video signal formed at the output of each of the photodetectors (13) is the result of scanning the input image on a trajectory defined by the channel contour coder. After amplification (see amplifiers (14)), the video signals enter the threshold devices (15). To attenuate the effect of irregularity of the mean transmission of the input transparency, a dynamic threshold is used in the unit (15) that is generated by integrating the initial video signal. The shaper (16) generates a set of square pulses; the number of pulses is determined by the number of intersections of the lines of the image being analyzed with the contour coder. The channel pulse counter (17) counts the number of pulses coming in to its input during a period of rotation of the scanning light beam. For this, it is fed a synchrosignal generated in the unit that forms the scanning beam. Unit 18 synchronizes the operation of the device elements.

The device also has a unit to receive the "traveling line" type scanning beam. It consists of a cylindrical lens, a mirror vibroelectric converter and a plane mirror.

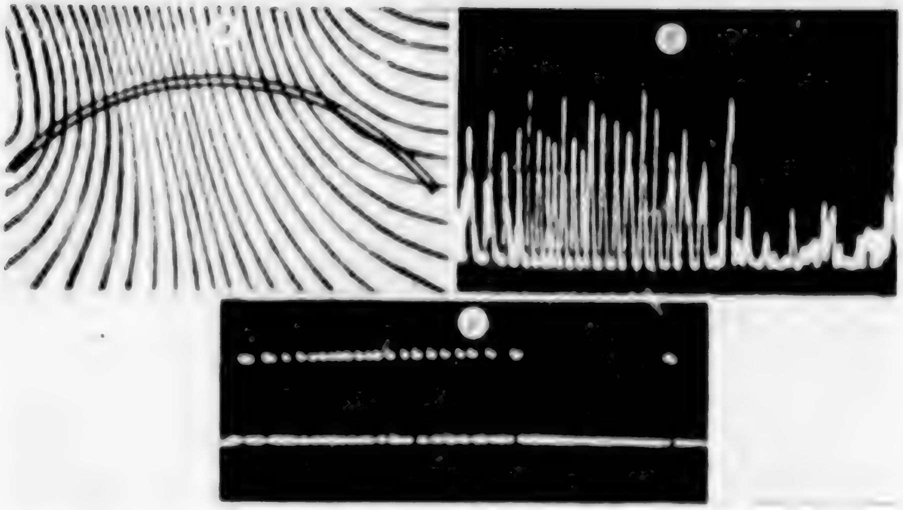


Fig. 2. a (top left) -- image being analyzed with contour coder;
b (top right)-- oscillogram of video signal at output of channel photodetector (FEU-60);
c (bottom) -- corresponding pulse signal at output of shaper

The presence of two types of scanning light beams together with a large set of optical masks for recording the contour coders ensures obtaining a broad series of different geometries of scanning.

The optoelectronic device for coding is the analog part of a hybrid system for recognition of line images. A digital electronic unit must perform the operations of learning and classification. To create a hybrid system, a minicomputer or special digital unit providing parallel processing of the features being formed can be connected to the coding device. The device contains 36 parallel channels for processing the input image. Images are input from film. When using the "rotating line" type scanning light beam, 36 features of the analyzed image are formed during the 20 ms period of rotation of the micrometric slit. In the case when the scanning light beam is a "traveling line," device speed is determined by the frequency properties of the vibroelectric converter. In the version described, system speed is 1 ms.

BIBLIOGRAPHY

1. Vasil'yev, V. I., "Raspoznayushchiye sistemy: Spravochnik" [Recognition Systems: Handbook], Kiev, Naukova dumka, 1969.

2. Duda, R. and Khart, P., "Raspoznaniye obrazov i analiz stsen" [Pattern Recognition and Analysis of Scenes], Moscow, Mir, 1976.

COPYRIGHT: Izdatel'stvo "Nauka", "Avtometriya", 1981

8545
CSO: 1863/196

ABSTRACTS FROM THE JOURNAL 'AVTOMETRIYA', JANUARY-FEBRUARY 1981

Novosibirsk AVTOMETRIYA in Russian No 1, Jan-Feb 81 pp 123-127

UDC 778.14:778.38

HOLOGRAPHIC METHODS OF MINIATURIZATION, COPYING, STORING, AND REPRODUCING DOCUMENTARY INFORMATION (SURVEY)

[Abstract of article by Vagin, L. N.]

[Text] The author analyzes the advantages of the holographic techniques of miniaturizing documents, surveys the types of holograms, describes systems of recording, restoring, and copying them, reviews the information characteristics of the holographic degree of miniaturization, and gives examples of the organization of archives of holograms and the designs and characteristics of holographic information devices. The article has 10 illustrations and 43 bibliographic entries.

UDC 681.39:681.3.07:621.378.9

ORGANIZATION OF A SYSTEM FOR MULTICHANNEL PARALLEL PROCESSING OF DATA ARRAYS

[Abstract of article by Tverdokhleb, P. Ye.]

[Text] The author reviews the design characteristics of the functioning and feasibility of a new specialized data processing system based on a permanent holographic memory unit and opticoelectronic parallel processors. A feature of the system is the possibility of flexible multichannel parallel-sequential processing of the content of holographic memory. The system is oriented to performing the tasks of retrieval, ordering, sorting, coding, and reorganization in established data arrays. The article has one table, five illustrations, and 18 bibliographic entries.

UDC 778.38

SINGLE-STAGE IRIDESCENT HOLOGRAPHY AND HOLOGRAPHIC INTERFEROMETRY

[Abstract of article by Tay, A., Chen, Kh., and Yuu, W. F.]

[Text] This article describes a single-stage process for obtaining iridescent holograms, based on the use of "aerial imagery" equipment. The authors discuss pseudoscopic and orthoscopic multicolor holographic images obtained by the single-step procedure. One of the most interesting and important applications of the single-step multicolor process is holographic interferometry. The article gives experimental data from a study of double exposure methods with averaging over time and used to shape the contours by this process. Moreover, it is demonstrated that a multiwave holographic interferogram can be created by this same single-step process. In comparison with traditional holographic interferometry, the single-stage process provides greater clarity, a reduction in speckle noise, and better image quality. The article has 13 illustrations and 14 bibliographic entries.

UDC 621.378.9:535.8:535.241.13

THE USE OF FREQUENCY SEPARATION OF SIGNALS DURING THE RECORDING OF UNIDIMENSIONAL HOLOGRAMS BY THE EMISSION OF SEMICONDUCTOR LASERS

[Abstract of article by Vovk, Yu. V., and Shchepetkin, Yu. A.]

[Text] The authors show the possibility of frequency separation of signals during data recording by means of an acoustical-optic modulator (deflector) and an injection laser. They successfully combine the ability of a semiconductor laser to generate short light pulses and the feature of the acoustical-optical modulator as a transparency suitable for displaying information that is continuous in time. The article has four illustrations and seven bibliographic entries.

UDC 681.7.013.82

PSEUDOCOHERENT CONVERSION OF NONCOHERENT IMAGES

[Abstract of article by Korolev, A. N.]

[Text] The article reviews a method of synthesizing a bipolar pulsed reflection in noncoherent systems for the purpose of performing the operations of spatial filtration. The technique is based on the use of a noncoherent optical system with two eyes whose characteristics independently or as the result of interaction in an interference system determine the resulting dispersion function. The practical possibilities of realizing pseudocoherent conversions of noncoherent images by means of this technique are demonstrated with a number of examples. The author presents the results of calculations that demonstrate certain features of these conversions using the method of direct image scanning. The article has 11 illustrations and 15 bibliographic entries.

UDC 535.317.2:531.715.2

OPTICOELECTRONIC SYSTEM FOR MEASURING THE DIMENSIONS OF MOVING OBJECTS ON THE BASIS OF THE DISPERSION OF LIGHT WAVES

[Abstract of article by Bogomolov, Ye. N., Bedernikov, V. M., Vertoprakhov, V. V., Kir'yanov, V. P., Krivenkov, B. Ye., and Chuguy, Yu. V.]

[Text] The article describes a high-speed precision system for measuring the dimensions of moving objects based on dispersion by the objects of interference poles formed by two slanted coherent light bundles. The dimensions of the objects are measured by counting the number of interference poles within its shadow image. The authors give results from an experimental study of a system using the example of monitoring cylindrical rollers. The error of measurement is analyzed. The article has two tables, four illustrations, and 10 bibliographic entries.

UDC 621.378:681.33

BROAD-BAND SPECTRAL ANALYSIS OF SIGNALS USING SILHOUETTE RECORDING (MODULATION)

[Abstract of article by Tay, A., and Yuu. F.]

[Text] The basic problem in optical spectral analysis of signals represented in density (brightness) form is the nonlinearity of the characteristic curve of the photographic film. This difficulty is overcome by recording information in silhouette form thanks to the dual method of representation. The authors demonstrate the possibility of using silhouette modulation for broad-band spectral analysis of signals. They show that in this case the results are identical to results obtained with density recording of signals. Because silhouette recording requires greater system space, with a given system field size the product of the space times the width of the band in silhouette recording is less than in density recording. The article has five illustrations and 13 bibliographic entries.

UDC 535.317.2:531.715.2

THE CORRELATION METHOD OF CLEARANCE MONITORING OF THE DIMENSIONS OF ARTICLES USING SPLITTING FILTERS

[Abstract of article by Mikhlayayev, S. V., and Chuguy, Yu. V.]

[Text] The article presents the correlation method of clearance monitoring of article dimensions. A holographic filter with pulsed reflection in the form of a field of clearances is formed in the optical filtration system by means of a standard object and splitting filters. This method makes it possible to monitor articles on a dynamic basis and can be used as the foundation for building high-speed monitoring units. The article has seven illustrations and five bibliographic entries.

UDC 621.382.375

ACOUSTICAL-OPTICAL MODULATOR-SPLITTER

[Abstract of article by Sheloput, D. V.]

[Text] This article reviews the principles of building acoustical-optical modulator-splitters for laser doppler velocity measuring devices. The author formulates the requirements for acoustical-optical materials. He gives the basic parameters (acoustical-optical quality, acoustical absorption, speed, and impedance) of the most promising acoustical-optical materials: n-octane, tellurite glasses, monocrystals of paratellurite, KRS-5 and KRS-6, potassium and cesium biphthalate, and others. The article discusses recommendations on selecting acoustical-optical and piezo electrical materials for specific devices. The author gives the basic parameters of experimental models of modulator-splitters that make it possible to receive large splitting angles (1-5 degrees) at low modulation frequencies (0-15 MHz). The article has six tables and 23 bibliographic entries.

UDC 535.4:778.38

MOVIE CAMERA-TYPE LENS FOR A RASTER

[Abstract of article by Dontsova, V. V., and Lenkova, G. A.]

[Text] The authors investigate the possibility of obtaining a short-focus movie camera-type lens for a raster by projecting a special semitone photo template on the film of chalcogenide glass-like semiconductors with a 10-fold reduction in the light of an argon laser (λ = 0.515 microns). The photo template is a photograph of Fabri-Perot interferometer rings with a pass band close to the profile of a Frenel phase lens. The lenses that are fabricated have a focusing distance of 18 and 9 millimeter and diameters of 3 and 2 millimeters. The maximum diffraction effectiveness of the lenses is 36 percent (54 percent without consideration of dispersed light). The resolution of the movie camera-type lenses is close to the diffraction limit. The article has three tables, two illustrations, and seven bibliographic entries.

UDC 531.717.1

DIFFRACTION CORRELATOR FOR CLEARANCE MONITORING OF DIMENSIONS WITH AN INVERSE OUTPUT CHARACTERISTIC

[Abstract of article by Solov'yev, N. G.]

[Text] The article investigates the output characteristic of a diffraction correlator for clearance monitoring of the dimensions of articles using a holographic filter with nonsymmetrical pulsed reflection. The study was made by calculation and experiment. The author shows that such a correlator can have a high level of conversion sharpness. Methods of obtaining filters are reviewed, and there is an analysis of the effect of the accuracy of filter alignment on the output characteristic. The article has five illustrations and five bibliographic entries.

UDC 531.715

ANALYSIS AND COMPARISON OF ANGULAR SCANNING INTERFEROMETERS

[Abstract of article by Lenkova, G. A.]

[Text] This article analyzes designs of interferometers with flat and angular reflectors designed to measure small angles and control the scanning angle of a beam. The author gives a technique to calculate the differential steps and displacement of the interfering beams. The article has one table, five illustrations, and three bibliographic entries.

UDC 621.3:621.396.535.8

THE POSSIBILITY OF USING OPTICAL ELECTRONICS IN A DEVICE FOR LOGICAL MULTIPLICATION OF A MATRIX BY A VECTOR

[Abstract of article by Mnatsakanyan, E. A., Morozov, V. N., Popov, Yu. M., Tsvetkov, V. A., and Yakovlev, G. D.]

[Text] This article reviews the possibility of using optical electronics in a device designed to perform the computation operation of logical multiplication of a matrix by a vector. It is demonstrated that the optical electronic version of the unit becomes promising when the basic elements make it possible to work with cycle frequencies equal to or greater than 10^7 Hz and the number of elements in the information picture is equal to or greater than 10^4. The article has two illustrations and two bibliographic entries.

UDC 535.4:546.32'131

HOLOGRAPHIC RECORDING ON THE BASIS OF PHOTO-INDUCED DICHROISM IN KCl:Na CRYSTALS

[Abstract of article by Nikolova, L., and Todorov, T.]

[Text] An experimental study was made of holographic recording based on the reorientation of the anisotropic F_A- and F_B-centers in KCl:Na. The authors obtained relationships between diffraction effectiveness and the length of the recording waves, recording energy, and the number of "record-erase" cycles. The article discusses the results on the basis of a theoretical model constructed earlier for volumetric polarization holographic recording in materials with photo-induced dichroism. The article has one table, five illustrations, and four bibliographic entries.

UDC 772.99

HOLOGRAPHIC RECORDING OF THE SPECTRA OF RADIO SIGNALS USING A REFERENCE LFM-SIGNAL

[Abstract of article by Buchin, A. V., Indzhiya, I. I., Korbukov, G. Ye., Krupitskiy, E. I., Moroz, S. V., Sergeyenko, T. N., Tsvetov, Ye. R., and Yakovlev, V. I.]

[Text] This article describes the principle of shaping a reference beam by modulating the light with a moving spatial analog of an LFM [linearally frequency modulated] pulse. This makes it possible to record the spectra of broad-band radio signals using low-powered lasers with a short recording time. The article has three illustrations and five bibliographic entries.

UDC 417:621.316.31

LIMITING SPEED OF ANALYSIS IN ACOUSTICAL-OPTICAL ANALYZERS

[Abstract of article by Buchin, A. V., Morozov, S. V., Sergeyenko, T. N., and Yakovlev, V. I.]

[Text] One of the most important parameters of analyzers is the speed of analysis. The authors demonstrate that with quadratic detection by a photoelectric sensor of light distribution an interfering signal occurs that may be eliminated by frequency filtration. But in this case it is necessary to impose limitations on the speed of analysis, because when it increases the resolution of the analyzer begins to worsen. The authors give results of an experimental test and present calculations of the dependence of analysis speed on the resolution of the analyzer. The article has three illustrations and four bibliographic entries.

UDC 681.325:621.378.9

CORRECTION OF ABERRATIONS OF THE OBJECTIVE FOR A HOLOGRAM RECORDING DEVICE

[Abstract of article by Gogachev, B. I., Volkov, V. V., Zhdanov, A. A., and Rakov, A. V.]

[Text] This article presents results of a study of a laboratory model designed and built as a device to record information in a matrix of holograms on photographic material for holographic memory units. The model uses an optical circuit with holographic corrections of aberrations of the recording objective, which is assembled from lenses produced in series by industry. A controllable liquid crystal transparency with a capacity of 10^4 bits is used to feed data. The device makes it possible to record about 10^4 holograms in an area of 100 × 100 square millimeters; in other words, the total capacity of a cassette with recorded information is about 10^8 bits. The article has one table, four illustrations, and nine bibliographic entries.

UDC 53.082.53/54

MODIFIED PROCEDURE FOR DETERMINING THE DIAMETER OF FIBERS BY THE INTERFERENCE PICTURE

[Abstract of article by Astaf'yeva, T. B., and Buishkov, R. M.]

[Text] The authors investigated the precision characteristics of the modified procedure for determining the diameter of a fiber by the interference picture of direct light dispersion. The method is based on recording several maximums of the picture in the domain of their greatest equidistance (for a given range of measurement of the indexes of refraction) and estimating their average width. The results of numerical calculations are given. The article has two illustrations and four bibliographic entries.

UDC 621.382(088.8)

MATRIX OF LIGHT-SENSITIVE TRIGGERS FOR READING INFORMATION IN OPTICAL-ELECTRONIC MEMORY UNITS

[Abstract of article by Voronin, Yu. V., Gusev, V. K., Roslova, M. L., Tolstoganov, V. K., Fedorov, V. B., Khodyukov, Yu. S., and Shilov, I. A.]

[Text] This article reviews the principles of constructing a high-sensitivity photo-receiving matrix for an optical-electronic memory. A light-sensitive trigger is the basic charge-sensitive element. The photo-receiving matrix of 1,600 photodiodes arranged within a field 160 × 160 millimeters with a step of four millimeters is calculated to receive paraphase-coded information and has an energy sensitivity of $5 \cdot 10^{-13}$ joules/bit and a power sensitivity of 20 nanowatts/bit. The electronic service units transmit information at a speed of 10 megabytes per second. The article has two bibliographic entries.

COPYRIGHT: Izdatel'stvo "Nauka", "Avtometriya", 1981

11,176
CSO: 1863/184

NEW AUTOMATIC TELEX SYSTEM PLACED IN SERVICE

Moscow MOSKOVSKAYA PRAVDA in Russian 14 Mar 81 p 3

[Article under the rubric "Done for the First Time": "Telex is Serving You"]

> [Text] 10 March, Tuesday. New programs were put into service for the electronic Telex station that provide additional services to subscribers.

This is the heart of Telex: a machine room in which several computers have been installed; capacities vary from a minicomputer to a high-throughput computer. This very complicated electronic equipment that fills up the station supports flawless quality of communications. Almost all connections made using Telex--95 to 97 percent--are serviced by automatic equipment.

Can one entrust telegraph concerns to electronics? How can a machine be taught that which only a human usually performs? The answer to these questions concern each of us, the entire economy of Moscow as a whole and the country since a qualitative level of communications means the expeditious solution to many problems, both everyday and production problems. And so, electronics. This assistant has become customary for specialists of practically all occupations. And the abbreviation "EVM" [computer] is encountered more and more often in plant accounts and in plans for development of production, municipal services, transportation and the sphere of services. In many cases, making good use of electronic computing complexes stems logically from the growing problems of modern technology. The emergence of the computer is sharply altering management of plants, scientific research centers and transportation centers. At times, the entire nature of production is changed. This is the effect that led to electronics coming to serve communications.

Several systems served by computers are now operating at the Central Telegraph Office. Telex is one of the latest innovations in this complex business. The station's subscribers are the firms, delegations of trade organizations, major industrial enterprises that fulfill the orders of various countries, and the client organizations that are equipping new factories and plants with imported technology. In short, Telex supports qualitative telegraph communication at the international level. The trade, cultural and business contacts between our country and foreign partners are growing continuously. Socialist integration is expanding and evolving. Thus, Telex has become the channel of expeditious communication in this system of business and friendly relations.

A computer receives the signal when a subscriber dials the needed number. An automatic link is set up. While some time was previously required for a subscriber's call, now it takes place almost instantaneously. Telex has other advantages too. It operates round-the-clock and very reliably. A human intervenes in this process only if at some stage along the "path" of the signal from one international station to another--and it may pass through many countries, it runs into a station that has no automatic system. But even then a computer issues all the necessary information on the connection to the operators and effects the link. The operator just gives instructions to the computer.

8545
CSO: 1863/218

BRIEFS

ELECTRONIC CALCULATOR--The "ELEKTRONIKA EPOS 73A" electronic, keyboard calculator is designed to perform bookkeeping, economic and technological calculations. The modern construction of the calculator, the display with large green numerals and the soft keyboard provides maximum comfort of use. The "ELEKTRONIKA EPOS 73A" EKVM (Electronic Keyboard Calculator) can perform the following operations: The four arithmetic functions (including use of a constant), extraction of square root, raising a number to any whole power, computation of percentage, reduction and addition by a constant amount, sequential and compound calculations, including use of memory register. Power supply: alternating amount at frequency of 50 cls, voltage 220 volts. Dimensions of the machine 241 x 185 x 177 mm, weight 1 kg. Wholesale price: 120 rubles. Address of manufacturer: 141120, Moskovskaya Obl., g Fryazino, plant imeni 59-Letiya SSSR. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 21, 1981 p 23] 9285

NEW DISPLAY PANEL--The DC gas discharge display panel IGP-17 is designed to display digital information up to 17 places. It features a high degree of human engineering, reliability and strength, a sturdy construction with small size, weight and required power and, in contrast to the VLI (expansion unknown)--absolute brightness constancy. In comparison to the gas discharge displays of batch construction, the IGP-17 makes the following possible: reduction by a factor of 5 of the labor required to install the display units, significant reduction in the weight and size of the display devices, significant simplification of the control circuit and reduction of its cost. All this adds to high efficiency of use of the IGP-17 display panel in many sectors of the economy, using minicomputers, networks of EKVM (electronic keyboard calculators), cash register devices, diverse numerical measuring instruments and radio electronic devices. Currently, we are completing the development of special IS (integrated microcircuits) for control of the TGP-17. Price handbook price -- 23 rubles. Technological conditions - 339, 219. Delivery conditions--through direct contract connections. Address requests to "Elektronika" sales and showrooms at the addresses: 394030, Voronezh, Kol'tsovskaya St., 46 or 196211, Leningrad, 46, Gagarin Prospect, 12. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 21, 1981 p 23] 9285

BREST COMPUTING PRODUCTION--The development of electronic computing technology was given much significance at the 26th CPSU Congress. The Brest electromechanical plant imeni 25th CPSU Congress has continuously increased its output of this technology. The volume of production in the enterprise is increasing mainly because of an increase in the productivity of labor. The products of the plant have also gained a good reputation abroad. For example, display sets, produced in the enterprise are sent to Czechoslovakia, Poland, the German Democratic Republic and other nations--members of CEMA. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 31 May 81 p 1] 9285

AUTOMATED CONTROL SYSTEMS--In the production association "Armelektromash", an automated system of control has been put into use. This system comprises the following series: "Seriya," "Melkoseriya," "Kompleks," and "Tekhnolog" and can solve up to 100 problems. The savings attributable to the ASU (Automated System of Control) is about two million rubles. The ASU will be used to answer questions about the technological preparation for production, technical economic planning, operational control of basic production, material and technical supply and sales, quality and bookkeeping. For the system to function to a full extent the association obtained a second computer "YeS-1022." Now both computers are housed in a new building, a group information processing, computer center of the enterprise. Special recording devices equipped with computer technology, installed in warehouses and assembly shops, will record all transfers of material and components within the association. The "Armelektromash" ASU will reach its full projected power at the end of the third year of the 11th Five-Year Plan. [Text] [Yerevan KOMMUNIST in Russian 22 Feb 81 p 1] 9285

NEW CURRENT METER--An instrument for the measurement of input and output values of current in integrated microcircuits of the series: 106, 109, 110, 112, 130, 133, 134, and 136 has been developed by captain-engineer I. Karavlov. The instrument has a removable front panel on which are located a clip for attachment to the microcircuit, a display indicator, a milliameter and switching elements for selecting the mode of operation depending on the dyne of microcircuit being tested. [Text] [Moscow TEKHNIKA I VOORUZHENIYE in Russian No 5, May 81 p 35] 9285

COPYRIGHT: "Tekhnika i vooruzheniye", 1981

CSO: 1863/199

APPLICATIONS

POCKET CALCULATOR TO COMPUTE RADIATION DOSAGE

Moscow VOYENNYYE ZNANIYA in Russian No 5, May 81 (signed to press 9 Apr 81) pp 32-33

[Article by A. Bryukhanov, candidate of technical sciences: "By 'Pocket' Calculator"]

[Text] Charts (gauges), graphs (nomograms) and tables are most commonly employed in evaluating a radiation situation. These can be used to perform relatively rapid calculations. But the assumptions possible in developing them are the main drawback of these nonmechanical devices. Graphs and tables are far from being universally applicable. As a rule they are designed to solve a fairly narrow range of problems. Plotting charts require a certain amount of skill to solve complex problems. The accuracy of graphs and plotting charts depends substantially upon their scale and the precision with which they are made. Tables do not provide answers if the raw data for a calculation fall between given scale values or beyond their range. There are many other drawbacks to the use of these devices.

Electronic computers are now being increasingly widely employed as a general-purpose means of automating calculations insuring accurate solution of the problems associated with the process of evaluating a radiation environment. Microcalculators (keyboard computers) are particularly promising in this application. They are miniature devices (pocket-size) and have a self-contained power source.

While not denying the usefulness of plotting charts, graphs and tables as means of obtaining approximate results in operational calculations, we the development of a procedure for solving certain problems involved in evaluation of radiation environments using microcalculators to be a matter of urgent importance. Let us assume we have to calculate the dose of radiation we would expect to receive from the radioactive contamination of particular area. Now, taking a specific example as a basis, let us look at the procedure employed to calculate these doses.

Radioactive contamination of area A began 3 hours following a nuclear explosion. At that point the radiation level was 150 R/h. It has been provided that from the time the area becomes contaminated the people will have spent 7 hours in a shelter with an attenuation factor K = 1000. They will then spend 15 minutes moving out to motor vehicles (for simplicity's sake the time required to board the vehicles will both here and throughout be disregarded) and be transported via points B and C to a railroad station D. The distance between points A and B is 10 km, between B and C 8 km, between C and D 12 km. The vehicles move at an average speed of 20 km/h over the AB leg of the route, 25 km/h over BC and 30 km/h over CD. Radiation levels at points B, C and D have been measured 2, 2.5 and 3 hours following the explosion and are 20, 25 and 35 R/h respectively. Aftering waiting 25 minutes for a train in a room with K = 10 the people board passenger cars and travel at 40 km/h the 23 km to point E, from which motor vehicles transport them at 20 km/h to destination F, which lies 3.4 km from E. There they will work 8 hours in production facilities having K = 7. Radiation levels at points E and F were measured 3.5 h after the explosion and were 45 and 50 R/h respectively.

It recommended that the calculation be performed in four steps. The first step consists of determining the time following the explosion at which the people cross the line at each destination along the route. The result is a table of raw data to be used in subsequent calculations similar to the table below.

The following designations are employed in the table: P - duration of stay at a given point or time en route on a particular leg of the trip, h;

t_e - time of entry into a point or of the beginning of movement on a given leg of the route, h; t_d - time of departure from a point or of the termination of travel on a leg of the trip, h; t_m - time of radiation measurement, h;

R_m - radiation level measured at time t_m, R/h; K = coefficient of attenuation of dose of radiation by ceilings, roofs and means of transportation.

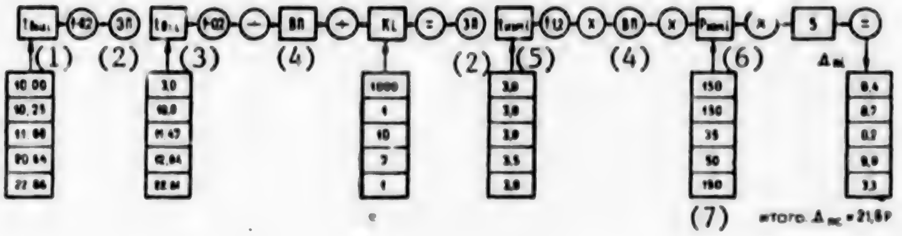


Figure 1. Key:

1. t_d
2. W
3. t_e
4. I
5. t_m
6. R_m
7. total

It is important that the order in which the points (legs of the trip) are arranged in the second column of the table correspond to the sequence in which they actually occur during movement over the route and that there be a separate line for each change in the value K, even if the location remains unchanged. The first line of the table, for example, indicates that the people at point A were in a shelter (K = 1000), the second line that they were in an open area (K = 1).

Each line of the table is numbered (i = 1.2 ...15). If we hereafter let Ai represent the value of a variable A (it could be any variable, for example, K, P, t_e, t_d etc.) with a specific value i we obtain the expression for finding t_e and t_d at all points along the route:

$$t_{ei} = C; \; t_{di} = t_{ei} + P_i; \; t_{ei} = t_{di - 1},$$

where C – time after explosion at which begins calculation of radiation dose, h.

The second step is to calculate the dose of radiation D_{ps} the people received at all points along their route at which they spent a given amount of time. The result of this step is a table of the doses received at the various points along the route:

i	Point, leg of route	P, h	t_e, h	t_d, h	Point of measurement	t_m, h	R_m, R/h	K
1	A	7.00	3.00	10.00	A	3.00	150	1000
2	A	0.25	10.00	10.25				1
3	AB	0.50	10.25	10.75	B	2.00	20	2
4	BC	0.32	10.75	11.07	C	2.50	25	2
5	CD	0.40	11.07	11.47	D	3.00	35	2
6	D	0.42	11.47	11.89				10
7	DE	0.58	11.89	12.47	E	3.50	45	3
8	EF	0.17	12.47	12.64	F	3.50	50	2
9	F	8.00	12.64	20.64				7
10	FE	0.17	20.64	20.81				2
11	ED	0.58	20.81	21.39				3
12	DC	0.40	21.39	21.79				2
13	CB	0.32	21.79	22.11				2
14	BA	0.50	21.11	22.61				2
15	A	0.25	22.61	22.86				1

i	Point	Radiation dose, R	Activity
1	A	0.4	sheltering
2	A	8.7	moving from shelter to vehicles
6	D	0.2	awaiting train
9	F	9.0	working
15	A	3.3	moving from vehicles to shelter

Total: 21.6 R

Dose D_{ps} consists of the doses the people have received at points where they have spent a certain amount of time (at points A, D and F, for example):

$$\underset{(1)}{D_{nc}} = \sum_{i=1}^{n} \underset{(2)}{D_{ni}},$$

$$1 - D_{ps}; \; 2 - D_{pi}$$

where $D_{pi} = 0$ if i represents movement between points and p the number of lines in the table.

Dose D_{pi} is calculated in accordance with the formula:

$$D_{\text{п}i} = 5P_{\text{изм}\,i}\,t^{1,2}_{\text{изм}\,i}\left(\frac{t^{-0,2}_{\text{вх}\,i} - t^{-0,2}_{\text{вых}\,i}}{K_i}\right)$$

(1) (2) (3) (4) (5)

$1 - D_{pi}$; $2 - R_{mi}$; $3 - t_{mi}$; $4 - t_{ei}$; $5 - t_{di}$

Then comes the third step, in which we calculate the dose of radiation D_{ds} received during movement between points along the route. The product of this step is a table of radiation doses received during movement between points:

i	leg of route	radiation dose, R	transportation
3	AB	4.6	motor vehicle
4	BC	0.5	motor vehicle
5	CD	1.1	motor vehicle
7	DE	1.5	rail passenger car
8	EF	0.8	motor vehicle
10	FE	0.4	motor vehicle
11	ED	0.8	rail passenger car
12	DC	0.5	motor vehicle
13	CB	0.2	motor vehicle
14	BA	1.8	motor vehicle

Total: 12.2 R

Dose D_{ds} comprises the doses the people received on all legs of their route (for example, AB, BC, CD, DE, EF, FE, ED, DC, CB and BA):

$$D_{\text{дс}} = \sum_{i=1}^{n} D_{\text{д}i},$$

(1) (2)

$1 - D_{ds}$; $2 - D_{di}$

where $D_{di} = 0$ if i represents a stay for a certain period of time at a point along the route.

If we employ the trapezoidal method we calculate dose D_{di} in accordance with the formula:

$$\begin{aligned}\underset{(1)}{D_{\text{дi}}} \overset{(2)}{=} \frac{0{,}5\,\Pi_i}{K_i}\Bigl[\underset{(4)}{P_{\text{изм н i}}}\Bigl(\frac{t_{\text{изм н i}}}{t_{\text{вн i}}}\Bigr)^{1{,}2} &\overset{(3)}{\underset{(5)}{+}} \\ +\underset{(7)}{P_{\text{изм к i}}}\Bigl(\frac{t_{\text{изм к i}}}{t_{\text{вк i}}}\Bigr)^{1{,}2}\Bigr], &\quad \begin{matrix}(6)\\(8)\end{matrix}\end{aligned}$$

Key:

1. D_{di}	5. t_{ei}
2. P_i	6. t_{mei}
3. t_{mbi}	7. R_{mei}
4. R_{mbi}	8. t_e

where indices b and e indicate that the values t_{mi} and R_{mi} correspond to the beginning and the end of a leg of the route.

In the fourth step we calculate the anticipated dose of radiation D. The result is the value of the sum

$$D = D_{ps} + D_{ds}.$$

Thus, in the course of traveling the route described in this example the people will receive a dose of radiation equal to 33.8 R.

A graphic representation of the sequence of the calculations of doses of radiation the people receive at a point along the route is provided by the figure, in which are employe the following designations: +, X, ÷, − - performance of the previously established operation (if any), that is, the operations of addition, multiplication, division or subtraction respectively; ↑k - raising to the power k; = - performance of the operation previously set up; W - write indicator readings into memory (if the microcalculator has no memory feature these readings are recorded on a form); I - call to indicator of memory contents (input of data written on form on microcalculators having no memory).

Let us note in passing that calculations of the doses of radiation received during movement between points are set up in accordance with the same principle.

I think anyone who develops a good mastery of the various manipulations of calculations using microcalculators can then move confidently on to the solution of other civil defense problems by "pocket" computers.

COPYRIGHT: "Voyennyye znaniya", 1981

8963
CSO: 1801/254

SECOND PHASE OF AUTOMATED SYSTEM FOR STATE STATISTICS IN OPERATION

Moscow VESTNIK STATISTIKI in Russian No 4, Apr 81 pp 41-48

[Article by N. Ivanov and A. Maslyanenko: "Second Phase of the ASGS [Automated System for State Statistics] in Operation"]

[Text] A top priority task for the agencies of state statistics in the 10th Five-Year Plan was to develop the second phase of the ASGS TsSU SSSR [USSR Central Statistical Administration Automated System for State Statistics].

Described in this article are the main functional and supporting subsystems and components of the second phase of the ASGS; some directions for further development of it are also outlined.

The second phase of the Automated System for State Statistics (ASGS) was developed in accordance with the tasks stemming from the decisions of the 25th CPSU Congress and the subsequent Central Committee Plenums. In doing so, a complex of complicated scientific and methodological, technical and organizational problems was solved by the USSR TsSU system.

All USSR TsSU subdivisions worked on carrying out the program compiled on the basis of the goals in the State Five-Year Plan for Development of the USSR National Economy for 1976 to 1980, wherein it was specified: "Develop and implement the second phase of the USSR TsSU Automated System for State Statistics (ASGS) that allows improving the statistical accounting and reporting system and raising the quality and validity of statistics."

At the end of 1980, the Interdepartmental Commission accepted for industrial operation the second phase of the USSR TsSU ASGS which included its territorial links--the Automated System for State Statistics of the union republic central statistical administrations. In doing so, it was noted that as a whole the second phase of the ASGS was developed on a rather high scientific and technical level.

The second phase of the ASGS was developed in stages.

First of all, the effort was defined, seven advance start-up functional subsystems were developed, and the first phases of automated data banks (ABD) for the ASGS were developed and implemented at the USSR TsSU GVTs [Main Computer Center], the Belorussian SSR RVTs KP TsSU [Central Statistical Administration Collective-Use

Computer Center], the Estonian SSR RVTs KP TsSU, and the VTsKP [Collective-Use Computer Center] of the Tomskaya Oblast Statistical Administration along with the system software in application program packages to automate programming of statistical problems on the Unified System of Computers.

In addition, development of complexes of electronic data processing continued and the problems of information support, development of the hardware base, as well as of legal and personnel support for the ASGS, etc. were attacked.

Of the functional subsystems under development in the ASGS, within the scope of the second phase, design efforts were carried out and the following seven subsystems were implemented: industrial statistics, agricultural statistics, capital construction statistics, material and equipment supply statistics, cultural and scientific statistics, personal budget statistics and foreign country statistics.

By an ASGS functional subsystem is meant the aggregate of statistical work united by a common object of statistical observation and represented by a system of interrelated indicators that comprehensively describe the status and development of the given object. Objects of observation may be the individual sectors of the national economy, elements of reproduction, trends and forms of economic activity and social phenomena.

Taken into account in selecting the advance start-up subsystems were factors such as the national economic importance of the corresponding sectors of the national economy, representativeness of the subsystems from the aspect of coverage of the different types of objects of observation, percentage of automated statistical operations in the subsystem and others.

All advance start-up functional subsystems were constructed on the territorial-hierarchical principle and as a rule include three levels of heirarchy: union, republic and oblast (kray, ASSR), while the agricultural statistical subsystem also has the rayon level.

The elements of the functional subsystems are statistical problems that as a function of type are united into electronic data processing systems (KEOI) [EDPS] and analytic systems. An EDPS is a unified organizational and technological form of automated data processing for statistical reporting. Analytic systems unite problems, the solution of which is based on using dynamic statistical series. To solve these problems, arbitrary aggregates of indicators stored in registers or automated data banks may be used.

An EDPS operated at all system levels by unified technology and based on centrally developed software is called systemic; a system implemented in the individual computer centers without transmission of processing results by hardware media or communication channels to higher level statistical agencies is called a local system; and a system developed only at the USSR TsSU Main Computer Center or the USSR TsSU TsVTs [Central Computer Center] is called a union system.

The functional subsystems are based on 110 EDPS, of these 33 are systemic and 77 are union, 12 analytic and 137 local systems. Of the 110 EDPS in the second phase of the ASGS, 70 new EDPS were developed and 30 were switched from the "Minsk" type computers to the YeS and mini computers. In addition to the efforts on introducing new EDPS, efforts are underway to improve 26 operating EDPS in accordance with the tasks stemming from the decree of 12 July 1979 by the CPSU Central Committee and the USSR Council of Ministers, "On Improving Planning and Strengthening the Influence of the Economic Mechanism on Increasing Production Efficiency and Work Quality."

The largest number of EDPS has been developed for the "Industrial Statistics" functional subsystem (10 systemic, 24 union, 2 analytic and 35 local systems).

During the period 1976 to 1980, 14 new EDPS were developed and implemented, 16 were switched to the YeS computers and the methodology and organization of data processing was improved on 4 systems. In the process, the data processing time periods were reduced for practically all EDPS while the volume of information output was increased and the analyticity of it was enhanced. Thus, in the system for f. [form] 22--Basic Indicators of Operation of Industrial Enterprises, the processing period was reduced 14 days while the volume of information output increased 3.4-fold; in the system for form 11--Availability, Movement, Structure and Average Annual Assets of Industrial Enterprises, information output volume increased while the processing period was reduced twofold, and in the system for form 59-tp, it was reduced by 11 days.

The important problem of qualitative improvement and deepening of economic statistical analysis of the efficiency of industrial production is solved in such analytic systems as "Analysis of the Process of Assimilation of Industrial Enterprises" and "Analysis of Efficiency of Modernization and Expansion of Industrial Enterprises."

The "Agricultural Statistics" functional subsystem is one of the complicated and dynamically developing sector parts of the ASGS. It includes 1 systemic and 1 union EDPS, 3 analytic and 47 local systems. Switched to the YeS computer in the second phase of the ASGS was the large effort "Basic Indicators of Annual Reports of Kolkhozes and Sovkhozes." In addition, the implementation of new complex groupings that describe their financial and economic activity has allowed a twofold increase in derivative analytic indicators.

The implementation of the analytic systems has made it possible to solve a number of important statistical problems on the analysis of a dynamic series of basic indicators of the development of agriculture, the efficiency of agricultural production, and the analysis and estimate of agricultural yields for the future. In addition, with the implementation of analytic systems, the degree of use of input information has grown considerably.

In the "Capital Construction Statistics" functional subsystem, the volume of data processed on the computer has increased considerably. This subsystem contains 13 EDPS, and 2 of them are systemic. It should be noted that 10 new EDPS were developed for this subsystem in the second phase of the ASGS. In addition, 2 systemic and 11 local systems were switched to YeS computers.

In the EDPS, "Consolidated Report on the Fulfillment of the Plan for Capital Construction by the Enterprises, Projects and Organizations of the USSR Ministry of Power and Electrification," the period for development at the union level was reduced from 9 to 3 days, and from 8 to 5 days for the system, "Report on the Use of the Limit on Capital Investment and Construction and Installation Operations for Construction of Major Animal Husbandry Complexes for Production of Animal Husbandry Products on an Industrial Basis."

The "Material and Equipment Supply Statistics" functional subsystem includes 6 systemic, 2 analytic and 2 local EDPS.

For this subsystem, three systemic EDPS were developed, one system was switched to the YeS computer, and the economic statistical integration of systems for forms No 1-sn, 2-sn and 4-sn was completed. The increase in the total volume of input information processed on computer at all system levels, compared to the first phase of the ASGS, was more than 170 million indicators, and the increase in output information was about 45 million indicators. Implementation of the EDPS made it possible to substantially reduce information processing periods (for example, for the EDPS for forms NO-1 and NO-2, by 40 days; for form 1-mekh, by 22 days; and for form 11-sn (annual), by 21 days).

For the "Cultural and Scientific Statistics" functional subsystem in the second phase of the ASGS, the range of problems solved was expanded and efforts were made to improve the statistical indicator system and deepen analyticity. Four EDPS, including two systemic and two union, were added to this functional subsystem. Processing time for annual statistical reports was substantially reduced (by 44 days for form 2-nk and by 64 days for form 3-nk).

The "Budget Statistics" functional subsystem includes four EDP and four analytic systems. Practically all statistical materials on budget statistics are computer processed. Mathematical statistical methods—calculation of weighted means and root-mean-squares, series of distribution, etc.--are used extensively in the subsystem. With that, a unified integrated primary document has been developed for statistical observation of budgets of workers, employees and kolkhoz workers that has yielded broader possibilities for study of the living standard of the different social groups in the population.

In the "Foreign Countries Statistics" functional subsystem, an EDPS allows international comparisons for the CEMA countries with extensive use of economic mathematical methods: calculation of price indexes for scaling of cost indicators in comparable currency, and determination of the ratio of levels and indicators of the structure of the economy of the countries being compared. Development and implementation of the "MIR" [world] automated data base has allowed raising the solution of problems of statistics of foreign countries to a qualitatively new level. Source information for the data base is a dynamic series that describe the development of countries for a number of economic sectors. The "MIR" data base operates in the interactive mode for information and directory service. Users interact with the computer with the aid of video terminals in the time-sharing mode.

For ten functional subsystems not in the advance start-up group, the most important and laborious statistical problems (EDPS) were switched to electronic processing in the 10th Five-Year Plan; the number of EDPS for these problems increased from 13 in the first phase of the ASGS to 34 in the second.

One of the largest efforts of the USSR TsSU in the 10th Five-Year Plan was the All-Union Population Census in 1979. For the first time in our country, in processing materials of major one-time statistical surveys, a census form filled out with machine-readable graphic marks was used directly as the source data technical medium for computer input.

Millions of these documents were input to "Blank-P" optical readers and recorded on magnetic tape. The information was transferred from the census forms to magnetic tapes at 29 multiple-user computer centers set up especially for this purpose using a number of republic and oblast computer centers of state statistical agencies.

Centralized processing of the population census data was done by the USSR TsSU central computing center on a YeS computer. Because of the use of modern computer equipment and advanced processing technology, the main census results were presented almost a month ahead of schedule.

Let us touch briefly on the main differences in the second phase of the ASGS. For the functional subsystems, the number of EDPS were increased from 46 to 110 (systemic and union). The main difference is the qualitative changes: working designs were developed for the advance start-up functional subsystems, which included the design solutions, EDPS and analytic systems.

The analytic systems are a new direction of efforts that allow solving a number of important problems on deepened economic statistical analysis of the development of social production.

Anothe distinguishing feature of the second phase of the ASGS is the development of the first phase of automated data banks (ABD). The ASGS automated data bank was developed by the USSR TsSU NII [Scientific Research Institute] as a result of studies of the features of various data base management systems for working with simple, tree and network structures. The ABD was built on the modular principle and is open for expansion of functional capabilities.

The first phase of the automated data banks for the automated system for state statistics was developed on the union level at the USSR TsSU Main Computing Center, on the republic at the Belorussian SSR TsSU Collective-Use Computer Center and the Estonian SSR TsSU VTsKP, and on the oblast level at the VTsKP of the Statistical Administration of Tomskaya Oblast. The automated data bank is used to accumulate, store, update, retrieve, process and output data. All the automated data banks have been developed on unified principles of methodological, informational and technical support and use common software.

The data base for the first phase of the ABD consists of long-term and current holdings and was formulated for the functional subsystems "Industrial Statistics," "Agricultural Statistics," "Capital Construction Statistics," "Cultural and Scientific Statistics," "Material and Equipment Supply Statistics," and "Budget Statistics."

Yet another distinguishing feature is the introduction of all-union classifiers of technical and economic information. As part of the information support, an automated system for managing the All-Union Classifiers of Technical and Economic Information (OKTEI) was implemented. These classifiers were introduced into 125 statistical reporting forms, including 44 industrial forms, 40 capital construction, 5 agricultural, 6 material and equipment supply, and 11 forms for labor and wage statistical reporting.

In accordance with the "Program of Work on Organization of Joint Functioning of the USSR Gosplan ASPR [Automated System for Plan Calculations] and the USSR TsSU ASGS within the Scope of Development of These Systems up to 1985," a list of problems of functional subsystems and a list of names of indicators for problems of joint functioning were defined.

In 1980, experimental work was done on several problems of the union level of the ASGS, in particular, on the report "Fulfillment of the Plan on Realized and Commodity Production of Industry in Address, Sector and Territorial Sections (chart 1-m)." The technology of data exchange on magnetic tape between the ASGS and the ASPR was tried out. Work was also begun on coordination of the ASGS with the USSR Gossnab automated system for management of material and equipment supply. The USSR TsSU Central Computer Center and the USSR TsSU Main Computer Center give data to the USSR Gossnab Main Computer Center on magnetic tapes for forms NO-1, NO-2, 1-sn, 2-sn and 4-sn. In the majority of the union republic central statistical administrations, programs of work have been drafted and approved to organize joint functioning of the ASGS and the republic automated systems for plan calculations.

New, compared to the first phase of the ASGS, were the efforts on developing system software in the form of application program packages:
input, verification and organization of data files--a package designed to automate programming procedures for input, output, verification and organization of data prepared on standard machine media;
automation of documentation of output information--a package allowing automation of the process of obtaining tables of complicated structure with editing of numeric and textual data;
general-purpose data processing system (data management and storage system)--a package for a closed-type system with autonomous language and program facilities to support data input, storage, management, processing and printing;
ASGS system for automation of software design--a package intended to automate design of a number of general-purpose software components.

A new and interesting automated system for monitoring and executing documents (ASKID) of the USSR TsSU, developed at the USSR TsSU Main Computer Center, was implemented in the second phase of the ASGS.

The ASGS hardware base was changed during the period 1976 to 1980. The introduction of the YeS computers at over a 100 computer centers in the TsSU system allows stating that qualitative changes have occurred in equipping the state statistical computer network. As part of the ASGS second phase, based on oblast and rayon (city) IVS [information and computing systems], 29 oblast and 168 rayon (city) computer centers were set up, more than 130 Unified System computers were placed into operation, more than 300 M-5000 PVK [punched card/tape computing complexes] were set up, and the first phasesof collective-use computer centers (VTsKP) were established in Tallin, Tomsk, Tula and Minsk.

The total capacity of the computer pool of the USSR TsSU computer network has more than doubled compared to that of 1975. The volume of work executed on computers has increased more than fourfold.

At the USSR TsSU system collective-use computing centers and a number of computing centers, teleprocessing facilities and key-to-magnetic-tape devices are being introduced and used in practical applications. A system for processing small statistical problems has been developed and implemented at the USSR TsSU Main Computing Center based on a minicomputer. In a number of USSR TsSU administrations and departments, terminals (displays) are being installed for operation with the ABD data base at the USSR TsSU Main Computer Center.

It mus also be noted that the introduction of the Unified System of Computers has facilitated raising the level of skill of the programmers and other specialists in EDP, and has allowed them to master the capabilities of modern program facilities and operating systems.

Development of the second phase of the ASGS has graphically shown what an important role is played by the economists in the sector administrations and departments of the USSR TsSU system at all of its levels in the development of the automated system for state statistics. Of great importance was the assignment of outstanding designers for each functional subsystem. Directors and specialists in the administrations and departments of the statistical agencies now not only prepare problem statements, but also take an active part in developing plans for the development of the ASGS, in the work of the scientific and technical councils on ASGS problems, in forming ABD data bases, define the nature of data bank queries, etc. Therefore, one is fully justified in stating that among the differences in the second phase is that the role of the economists and statisticians in developing the ASGS has been significantly enhanced.

Thus, one may say that in practically all the subsystems of this intricate and multifaceted ASGS, in recent years new and modern facilities have been developed and implemented to process and analyze information, and new elements and features have emerged that allow noting the quite definite distinctions of the second phase of the ASGS from the first.

These are the new functional subsystems and automated data bases, the system software packages and analytic systems, the automated system for managing the unionwide classifiers of technical and economic information and introduction of teleprocessing devices, and finally, which is very important, this is the raising of the skill levels of the specialists in the USSR TsSU system, who now, having acquired considerable experience in automated processing of information, are well acquainted with the capabilities of modern facilities for acquisition, processing and analysis of statistical data under the conditions of operating the ASGS.

Development and implementation of the second phase of the ASGS has made it possible to raise considerably the quality of statistics in accordance with the increasing demands for improvement of planning and managing the national economy. The economic effectiveness of the second phase of the ASGS is largely determined by the capability of the system to process the ever growing volumes of data needed to manage and plan through such basic factors as reducing labor and physical inputs for data processing and its deepened analysis, and reducing the labor-intensiveness of data processing while raising labor productivity, which allows processing continually growing volumes of data without substantially increasing the number of workers.

While the number of workers in the USSR TsSU computer system increased by 20 percent, the volume of work performed increased more than 1.6-fold, including the fourfold increase with computers.

Among the other factors of effectiveness that must be mentioned are: the increase in data validity through the improvement in checking and processing methods; the deepening of the analyticity of the developed statistical indicators by using economic and mathematical methods and deriving additional profiles for analysis of the economic processes and phenomena in the national economy; the reduction in time periods for processing and presenting needed statistical data and the capabilities of expeditious preparation of analytic queries and notices for the directing agencies at the various managerial levels.

Development of the second phase of the ASGS and improvement in the utilization of the USSR TsSU hardware base have made it possible not only to increase the amount of work performed and reduce the periods for presentation of reporting data, but also to hypothetically release workers. Thus, according to estimates made by USSR TsSU specialists, about 40,000 more people would have been required to process the continually growing volume of information in a timely and qualitatively fashion without the use of modern computing equipment and the improvement in data processing methods during the last five-year plan.

Nevertheless, along with the results achieved, there are a number of problems that still have to be solved in the process of developing the automated system for state statistics.

Thus, steps have to be taken to equip further the USSR TsSU system computer centers with the required capacities of YeS and mini computers, key-to-tape units, displays and, especially, data transmission facilities, without which the problem of automating the acquisition of statistical data for certain types of urgent statistical reports cannot be solved. It is essential to continue the development of methodological materials on planning development and on analysis of the functioning efficiency of the USSR TsSU network of computer centers, to develop the system software and capabilities of the automated data banks, to increase the role of the stock of USSR TsSU algorithms and programs on acquisition and propagation of program resources, to wage a more intensive effort on ASGS interaction with other automated management systems, to continue the efforts to improve the methodology of determining the economic effectiveness of the ASGS and the USSR TsSU computer network, etc.

On the whole, in the 11th Five-Year Plan the ASGS will be developed in accordance with the tasks for the state statistical agencies stemming from the decisions of the 26th CPSU Congress and the "Main Directions of USSR Economic and Social Development for the Years 1981 to 1985 and for the Period up to 1990."

COPYRIGHT: Izdatel'stvo "Finansy i statistika", 1981

8545
CSO: 1863/192

USSR CENTRAL STATISTICAL ADMINISTRATION MAIN COMPUTER CENTER IN THE 10TH FIVE-YEAR PLAN

Moscow VESTNIK STATISTIKI in Russian No 4, Apr 81 pp 48-52

[Article by Yu. Vasil'yev, Ya. Boronin and Ya. Tsipis]

[Text] The 10th Five-Year Plan for the USSR TsSU [Central Statistical Administration] Main Computer Center [GVTs] was a time of intense creative work. The efforts of the collective were aimed at carrying out the measures of the USSR TsSU for the state statistical agencies stemming from the decisions of the 26th CPSU Congress and the subsequent Central Committee Plenums, fulfilling the production plan of the 10th Five-Year Plan and the plans for statistical operations ahead of schedule, and developing electronic data processing systems [EDPS].

During the years of the past five-year plan, the amount of work performed by the GVTs increased substantially. Thus, the total volume of work in value terms compared to the Ninth Five-Year Plan increased more than half, the volume of statistical information processed--by almost 40 percent, and the amount of data processed on computers almost doubled.

The plan of the 10th Five-Year Plan for total amount of work in value terms was fulfilled ahead of schedule on 3 December 1980 (17 December for socialist pledges). On the whole for the five-year period, the plan was fulfilled by 102.3 percent, and output per worker increased by 34.4 percent. The quota on reducing cost of operations was met. It should also be stressed that the GVTs successfully accomplished the annual plans for work in the 10th Five-Year Plan, ensuring timely presentation of statistical reports to party, soviet directing agencies, ministries and departments.

While raising labor productivity and the level of organization of work in all its subdivisions, the GVTs continually reduced the time periods for preparation and issue of reports. Thus, during the period 1976 to 1980, the planned schedules for 355 statistical efforts were reduced. In accordance with socialist pledges made, 540 efforts were completed ahead of schedule.

Reducing the time for preparation of statistical reports (especially annual) is one of the major factors that made it possible to prepare and publish the annual NARODNOYE KHOZYAYSTVO SSSR somewhat earlier.

Since 1979, data have been produced monthly, within reduced time periods, for reports and inquiries from the USSR TsSU on industrial and capital construction statistics on an expanded range of indicators.

To execute the decisions of directing agencies, GVTs has provided a number of new statistical reports not stipulated in the plan: on fulfillment of the plan for construction of facilities with an especially important function; on the course of construction of territorial-production complexes; on fulfillment of the plan for production of critical commodities, commodities in popular demand and children's goods; and on the execution of measures to protect nature and make rational use of minerals.

Also included in the work not provided for by the plan was the development of data for a one-time accounting of the availability of automated management systems and computer equipment and the efficiency of their utilization as of 1 January 1978; a survey of the modes of operation of enterprises, organizations and institutions engaged in serving the population and a study of the actual use of working time in sectors of the national economy; an inventory of the balances of stocks of finished products and materials subject to transportation by rail; a sample survey of the actual use of trucks on the main highways in the cities of Moscow, Leningrad, Kiev, Minsk and Rostov-on-Don; and on the expected fulfillment of the plan in 1980 on production in value terms and labor productivity by industrial enterprises of union subordination by results for 9 and 11 months in 1980 and others.

In the 10th Five-Year Plan, a complex of measures were implemented to raise the quality of preparation and issuance of statistical reports. In particular, supervision has been strengthened over the quality of preparation of statistical reports at all stages of the GVTs technological process, and work has been improved with the union republic TsSU RVTs [republic computer centers] on inspection and rendering of assistance and strengtheing the reporting discipline of enterprises and organizations of the national economy. The GVTs gave concrete aid to improve work to the RSFSR TsSU RVTs and the RVTs of the TsSU of the Turkmen, Tajik and Armenian union republics. On individual sectors of statistics, aid was given to the RVTs of the TsSU of all union republics.

As a result of the work done in the Main Computer Center and the computer centers in the USSR TsSU system, the quality of statistical reporting has been raised substantially and the number of delays in producing reports has been reduced.

As is known, in the 10th Five-Year Plan, the USSR TsSU system worked intensively to implement the second phase of the ASGS [automated system for state statistics]. The GVTs took a most active part in this major effort. Much attention was paid to reequipping the GVTs with modern computers. This enabled development of new technological principles for processing statistical data with use of displays and gave the specialists working in the sections that prepare and issue statistical materials the capability of interacting directly with the computer for data input and correction.

In the GVTs, new methods of data acquisition using minicomputers which eliminate punching, and the fundamentally new technology of solving small statistical problems by using these minicomputers were developed and implemented. The "MIR" [World] ABD [automated data bank] which provides for integrated processing of foreign statistical data in the on-line interactive mode was designed and turned over for industrial operation. The formation of output information by the automated method not only raises the level of mechanization of computing operations, but also provides the capability of complex economic analysis, expansion of the program of international comparisons, forecasting, etc. The automated system, "Monitor of Document Execution," was developed on the basis of the "Realite" minicomputer. This system allows raising considerably the level of the executive discipline in the USSR TsSU and GVTs.

The GVTs has a large programming effort. To improve programming of statistical problems, the "Otchet" [Report] standard package of application programs was developed for the YeS computers; it provides the capability of processing on computers more than 30 percent of the reports on fulfillment of the plan for production of goods in physical terms. A special system (SOMSZ) was created to develop small statistical problems on minicomputers.

An information base for the first phase of the automated data banks was created in the GVTs for development of the automated data bank for the ASGS using the YeS computers.

The experimental work done in the USSR TsSU GVTs with selected communication channels will make it possible in the near future to switch to the more modern technology of data exchange between the USSR TsSU GVTs and the union republic TsSU RVTs; this will provide the capability of raising the validity and speed of processing statistics.

Efforts were also performed on organizing the management and implementation of unionwide classifiers to provide the information bases for ASGS interaction with other automated management systems. Introduction in the GVTs of automated management of the Unionwide Classifier of Enterprises and Organizations (OKPO) has permitted successful introduction of it in a number of EDPS.

The problems of interaction between the ASGS and the ASPR [automated system for plan calculations]--the two major automated systems in the country--have also received attention in the GVTs. To exchange data between these two systems, a list of basic problems and the technical specifications for this exchange were defined in particular. Practical data exchange on magnetic tapes has already begun with the USSR Gossnab GVTs.

As the lead organization for development and implementation of concrete software for the second phase of the ASGS, the GVTs conducted this effort taking into account the capabilities of the YeS computers that allow developing more efficient technology for processing statistics.

In the USSR TsSU system, the GVTs was charged with development and implementation of EDPS. By the start of the 10th Five-Year Plan, 41 EDPS, including 25 systemic, had been implemented in the USSR TsSU system. As part of the second phase of the ASGS, there are 110 EDPS and 12 analytic systems. The GVTs has done much work to improve the systemic EDPS, proceeding from the changes in statistical reporting and the newly introduced forms in accordance with the decree of 12 July 1979 by the CPSU Central Committee and the USSR Council of Ministers. Certain statistical reporting forms were reviewed jointly with the USSR TsSU administrations and departments and new indicators were put into them. New problem definitions were developed and approved for 20 EDPS, and software was developed for 10 EDPS. The necessary work has been done that will make it possible to introduce 12 EDPS in 1981.

In developing the EDPS, standard procedures were used more extensively, the switch to using application program packages was made, work was done on unification of the information base for the EDPS and the unionwide classifiers were employed.

In the 10th Five-Year Plan, both qualitative and quantitative changes occurred in the GVTs hardware base, and facilities for data acquisition and processing were improved. During the period 1976 to 1980, the center's hardware base was modernized and reequipped; third and fourth generation computers were installed. The GVTs is now one of the most advanced computer centers in the USSR TsSU system in terms of hardware and technology used. The effort accomplished on hardware reequipment in the 10th Five-Year Plan has created a base for further expansion of electronic processing of statistics in the 11th Five-Year Plan.

Successful solution to the production problems facing the collective was facilitated by the continual work done by the GVTs management and its party, trade union and Komsomol organizations on personnel selection, assignment, training and education, on improving its qualitative composition and on raising responsibility for work entrusted, and by improving the style and methods of work.

Guided by the decisions of the 25th CPSU Congress and the CPSU Central Committee decree "On Further Improvement of Ideological and Politicoeducational Work," the party, trade union and Komsomol organizations employed various methods and forms in work with personnel on political, labor and moral education. The complex long-term plans for ideological work and the plan for social development of the collective of the USSR TsSU GVTs were fulfilled.

In the 10th Five-Year Plan in the GVTs, socialist competition was developed further; the entire collective participated in it and new forms of it were employed. Making personal socialist pledges and the movement for the title of "Exemplary Section" and "Collective of Communist Labor" were promoted extensively. Participating in the movement for a communist attitude toward labor are 1,020 people; 689 people hold the title of "Shock-Worker of Communist Labor," and and 8 collectives were awarded the title of "Collective of Communist Labor" and "Exemplary Section."

Each year, the Main Computer Center initiated making increased socialist pledges. The collective took an active part in suitable preparation with labor presents for the major significant dates in the life of our country--the 60th Anniversary of Soviet Power, the adoption of the new USSR Constitution, the elections to the USSR Supreme Soviet and the RSFSR Supreme Soviet, and V. I. Lenin's 110th birthday.

In the first year of the five-year plan, among the operators there was promoted the movement for a "Five-Year Plan of Quality--Worker's Pledge to Work without Errors and to Fulfill Annual Personal Plans Ahead of Schedule." For the 60th Anniversary of Great October, 46 operators fulfilled annual plan quotas ahead of schedule; for the first Anniversary of the new USSR Constitution, 45 operators fulfilled the quota of the third year of the five-year plan.

The GVTs collective supported the initiative of the leader-operator and Komsomol member L. I. Nikolayeva to "Make 1980 a Year of Shock Work and Work in the Lenin Style."

For V. I. Lenin's 110th birthday, 21 operators fulfilled their personal five-year quotas, and 15 of them were awarded the honorary Leninist certificate. And 40 GVTs workers were awarded the badge of "10th Five-Year Plan Shock Worker."

Much importance has been attached to publicizing competition. The GVTs Honor Board is renewed annually. In 1979, the GVTs Honor Book was instituted and 12 veterans of labor were recorded in it. Socialist competition results were reflected on the display "Screen of Socialist Competition."

Contests for "Best in One's Occupation" were used in the GVTs as a form of labor education and propaganda of expertise. Contests were held among the typists, the YeS computer operators, calculating machine operators and teletypists. In April 1980, a contest was held among the keyboard machine operators of the USSR TsSU GVTs and the RSFSR TsSU RVTs, dedicated to V. I. Lenin's 110th birthday.

The effort to make work more efficient was promoted further in the GVTs; during the five-year plan, 42 suggestions were submitted by rationalizers and implemented; this allowed raising the efficiency of use of computing equipment and improving the technology and efficiency of machine processing.

With a feeling of deep appreciation and gratitude, the GVTs collective accepted award of the travelling Red Banner of the CPSU Central Committee, the USSR Council of Ministers, the VTsSPS [All-Union Central Trade-Union Council], and the Komsomol Central Committee for the high results achieved in the All-Union Socialist Competition to Raise Production Efficiency and Work Quality for the results for 1976, 1977 and 1978 and the recording in the Honor Book of the CPSU MGK [Moscow City Committee], the Mossovet [Moscow City Soviet of Workers' Deputies], the MGSPS [Moscow City Council of Trade Unions], and the Komsomol Moscow City Committee. In response to this high rating of its labor, the GVTs collective promoted even more extensively the socialist competition to fulfill the plans of the 10th Five-Year Plan. For high production indicators, the GVTs collective took prize positions in the results of socialist competition among the computer centers in the USSR TsSU system: third place for the third quarter of 1979 and second place for the fourth quarter of 1979; in 1980, second place for the first quarter, and first place for the third quarter with presentation of the travelling Red Banner of the USSR TsSU and the Central Committee of the trade unions for workers in state institutions.

Having risen up for the labor shift in honor of the 26th CPSU Congress, 6 operators fulfilled their personal annual quotas by 7 October, 13 operators by 7 November 1980, and 21 statistical jobs were completed ahead of schedule.

The major tasks of the GVTs in the 11th Five-Year Plan are: to raise the quality and speed of processing statistics based on extensive introduction of new types of computer equipment and advanced technology; to improve EDPS software, keeping in mind development of the capability to make expeditious changes in it as required by the USSR TsSU and its local agencies; to develop an automated system of accounting, planning and management of GVTs production on the model of industrial enterprises, to develop further the complex approach to ideological and educational work in the collective; to raise the level of labor activeness of the workers; and to improve socialist competition.

* * *

For achieving high results in the All-Union Socialist Competition to Raise Production Efficiency and Work Quality in 1980 and for successfully completing the 10th Five Year Plan, the Main Computer Center was awarded the travelling Red Banner of the CPSU Central Committee, the USSR Council of Ministers, the VTsSPS and the Komsomol Central Committee.

COPYRIGHT: Izdatel'stvo "Finansy i statistika", 1981

8545
CSO: 1863/192

MINSK COLLECTIVE-USE COMPUTER CENTER TURNED OVER FOR INDUSTRIAL OPERATION

Moscow VESTNIK STATISTIKI in Russian No 5, May 81 pp 32-34

[Article prepared by T. Ter-Izrael'yan, in the section: "Mechanization of Accounting and Statistical Work"]

> [Text] "Provide for further development and increase in the efficiency of the network of automated managements systems and collective-use computer centers, continuing their unification into a common statewide system for acquisition and processing of information for accounting, planning and managing."
>
> From the "Basic Directions for USSR Economic and Social Development for the Years 1981 to 1985 and for the Period up to 1990."

Collective-use computer centers (VTsKP) are one of the most progressive organizational forms of using computer equipment today. Of the seven centers turned over for operation in the 10th Five-Year Plan, four were set up on the base of the USSR TsSU [Central Statistical Administration] system. In 1979, VTsKP were turned over for test operations in Tallin, Tula and Tomsk.

At the end of 1980, the first phase of the Minsk VTsKP, set up on the base of the BSSR TsSU Republic Computer Center, was turned over for industrial operation. The first phase of the Minsk VTsKP was designed and built by the BSSR TsSU Republic Computer Center and the Belorussian branch of the VGPTI [All-Union Technological Design Institute] under the scientific methodological guidance of the NII TsSU SSSR [USSR Central Statistical Administration Scientific Research Institute] and the VNIIPOU GKNT [All-Union Scientific Research Institute of [POU - unknown] of the State Committee for Science and Technology] and with the participation of the VTsKP users. Work on developing it was organized by the USSR TsSU GUVR [Main Administration of Computer Operations] and the BSSR TsSU GUVR.

The Minsk VTsKP is now performing information-computing work for party and soviet agencies of the Belorussian SSR and for enterprises and organizations of various sectors of the national economy. In 1980, over 3 million rubles worth of work was done for 154 enterprises and organizations. The average daily computer load for a calendar day by the end of the year was 15.6 m/hour.

Among the users of the first phase of the Minsk VTsKP are 20 enterprises and organizations, including the BSSR Council of Ministers, the Minsk Oblast Executive Committee, the BSSR TsSU, the BSSR Goskomtsen [State Committee for Prices], the BSSR Minsobes [Ministry of Social Security], the Belorussian republic production association "Vtorchermet" [processing of secondary ferrous metals], Goskomnefteprodukt [State Committee for Petroleum Products] and others. Problems have been solved for these users within the framework of automated systems.

Since the developers lacked experience in designing automated management systems on the base of a VTsKP and because the questions of technology, software and organizational-legal support were not fully solved, the design proceeded in stages. At first, jobs were processed in the local batch processing mode, i.e. without using communication channels. Information was presented to the center in the form of documents, punched, processed and delivered to users by courier. Then, as user terminals were installed and the system software modified, the mode of remote batch processing was tried out. Information was prepared directly on the user's terminal and sent through communication channels to the VTsKP, processed and the results went back over the communication channels to the user. The third stage was the try out of the hardware complex (KTS) and software to implement the time-sharing mode.

Within the first phase of the Minsk VTsKP, over 100 jobs are processed, including: accounting and analysis of plan fulfillment in the "ASOI [automated data processing system = ADPS] for Vtorchermet;" calculating pensions for pensioners in Minsk (ADPS for the BSSR Minsobes); a complex of problems on analysis of effectiveness and utilization of labor inputs, fixed industrial-production capital and production capacities in ASOIDO [unknown ADPS] and others. In addition, the Minsk VTsKP may render services to users on using group information holdings. A considerable number of algorithms and programs is being developed here; by making use of them, the center will be able to render one-time services to users for data processing.

The collective-use computer center has two complexed YeS-1033 computers and a YeS-1022. All computers have the expanded set of peripherals.

Data teleprocessing modes have been implemented in the Minsk VTsKP by using multiplexors of data transmission, user terminals and display complexes. Data is transmitted over switched and non-switched communication channels.

Software in the first phase of the Minsk VTsKP includes programs to control the joint operation of the computer complex and the subscriber network, and programs to solve user problems.

The time-sharing system (SRV) and software system (SPO) are used as teleprocessing facilities in addition to the telecommunication methods of access to control the subscriber network. These facilities provide independent access by users to the VTsKP resources. Thus, at the time the VTsKP was turned over for industrial operation, several user terminals operated simultaneously and over 300 queries were tried out during the tests. The steady operation of the teleprocessing system was also noted. Tests showed that breakdowns in the communication channels do not lead to the loss of information and disruption of the user network. As mentioned earlier, a two-machine complex is used in the VTsKP. In the process, while one machine services the user terminal network, the other processes data in the batch mode, which enhances system operation reliability and computing resource use efficiency. It should also be noted that independence of the data transmission and processing is allowed for by the technology developed for the VTsKP.

In the process of organizing the VTsKP, new subdivisions were set up: a section for VTsKP development, an operative-dispatcher section, a systems software section, a section for putting together and managing information holdings, a section for designing the algorithms and programs for user problems, a section for technical servicing of subscriber equipment and others.

The Minsk VTsKP has a number of indisputable advantages. Among them, as the Interdepartmental Commission noted, should be mentioned: the capability of expanding the subscriber network without additional construction of communication channels; use of the OS 6.1 operating system containing teleaccess facilities; use of teleprocessing facilities to control the subscriber network in the time-sharing mode; creation of an information data base and introduction of the BSSR ASGS ABD [automated data bank] based on the "ISKHOD" [outcome] ABD; functioning of the "Display Class" that supports collective debugging of progarms in the interactive mode; use of automated facilities to control the technological process ("DISS") that supports compiling the schedule for solving user problems; support of the functioning of the AP-64 with the use of the common telecommunication access method in YeS OS; use of application program packages ("Svod" [summary] and "Prognoz" [forecast] developed by the BSSR TsSU RVTs) that raise the level of automation of programming with the use of displays in the time-sharing mode; and development by the Belorussian branch of the VGPTI of the "VTsKP Dispetcher."

The excellent working contacts between the BSSR TsSU GUVR, the Belorussian branch of the VGPTI and the BSSR TsSU RVTs are the bases for the successful development, implementation and turn-over of the Minsk VTsKP for industrial operation. The hardware was modified and the software developed by their efforts.

Setting up the VTsKP opens great possibilities for statisticians too. The statistician, as M. A. Korolev, first deputy chief of the USSR TsSU said, is being given a new hardware base corresponding to the current stage of development of the economy (see VESTNIK STATISTIKI, No 3, 1980). All facilities at the VTsKP should be used actively to attract an ever greater number of subscribers. This will correspond to the country's engineering policy, help overcome the tendencies associated with the striving by enterprises to have their own computer center without fail, and facilitate raising the economic effectiveness of introducing computer technology in the national economy. Effectiveness is achieved largely thorugh concentrating computing resources and specialists at the collective-use computer center and through raising the level user services.

The first VTsKP were the result of purposeful and intensive efforts of all the teams of the agencies of state statistics, as well as of the ministries and departments that participated directly in solving this problem, such as the USSR State Committee for Science and Technology, the USSR Gosplan, the ministries of instrument building and communications, as well as the VTsKP subscribers.

The efforts associated with establishing the collective-use computer center have their own specific nature and we hope that the experience of establishing and operating the Minsk Collective-Use Computer Center will be actively used in organizing new and developing existing collective-use computer centers.

COPYRIGHT: Izdatel'stvo "Finansy i statistika", 1981

8545
CSO: 1863/192

AUTOMATED DATA BANK FOR THE BELORUSSIAN SSR CENTRAL STATISTICAL ADMINISTRATION

Moscow VESTNIK STATISTIKI in Russian No 5, May 81 pp 34-38

[Article by N. Kononov, L. Makarchuk and O. Volkova, in the section: "Mechanization of Accounting and Statistical Work"]

[Text] In November 1980, the Interdepartmental Commission accepted for industrial operation the first phase of the automated data bank (ABD) for the Belorussian SSR TsSU [Central Statistical Administration].

The data bank was established by the collectives of the BSSR TsSU, the Belorussian branch of the USSR TsSU VGPTI [All-Union Technological design Institute] and the BSSR TsSU RVTs [republic computer center] based on the "ISKHOD" automated data base for the ASGS [automated system for state statistics]. Scientific methodological guidance for setting up the data bank and rendering practical aid was provided by the USSR TsSU NII [Scientific research Institute]; the BSSR TsSU GUVR [Main Administration for Computer Operations] coordinated the work and monitored the implementation of the individual stages.

The automated data bank is the central organizing link in the automated system for state statistics (ASGS) which supports the improvement and automation of the technology of processing statistics and meets the needs of users. The automated data bank was set up on the Hardware base of the Minsk Collective-Use Computer Center.

Five main functional subsystems (statistics for industry, agriculture, capital construction, budgets and supply of materials and equipment) have been included in the first phase of the automated data bank.

The "Industrial Statistics" functional subsystem is an intricate complex of accounting and analytic work united by the system of statistical reporting documents, interconnected users and methods of observation and analysis. For the first phase of the "BSSR TsSU ABD" for this subsystem were selected indicators that describe the output of the major types of products in physical terms; the amount and efficiency of industrial production; quality of products made, as well as indicators of the production-adminsitrative activity of the industrial enterprises.

The "Agricultural Statistics" functional subsystem is a complex of statistical work describing the status, development and efficiency of this sector. Selected for the first phase of the ABD were indicators of the subsystem in physical and value terms, describing the development and efficiency of farm production and animal husbandry, the base of materials and equipment, as well as the production-financial activity of the agricultural enterprises.

The "Capital Construction Statistics" functional subsystem is a complex of statistical work united by the system of interconnected indicators describing the status and development of capital construction, assimilation of capital investment by sectors, the construction industry and planning and surveying activity. Selected for this subsytem for the first phase of the ABD were indicators on commissioning of fixed capital and production capacities, capital investment, capital construction in agriculture, housing and cultural construction, as well as indicators describing the activity of the builder for major projects.

The "Budget Statistics" functional subsystem is designed to acquire, accumulate, store, process and output statistics describing the standard of living for the republic's population. Selected for this subsystem were indicators describing the composition of families by number, age and sex, employment of family members, level and structure of family income by source, level and structure of family expenses, size of aggregate income by source, amount and level of purchases and consumption of material wealth and services, physiological value of the actual daily food ration of workers, employees and kolkhoz workers, and productivity of cattle on private subsidiary farms.

The "Material and Equipment Supply Statistics" functional subsystem is a complex of statistical work reflecting the processes of distribution, turniver and use of production facilities under the specific conditions of place and time. Included in this subsystem are indicators describing balances and the arrival and consumption of ferrous metals and construction materials for production needs and capital construction.

In setting up the BSSR TsSU ABD, much attention was paid to information support (description of the data base structure, the information language, the system of indicators and objects of observation, and the system of documentation) established on the basis of the principles of integration and development in solving problems in the various modes of ABD functioning.

A data base is a specific form of an organized aggregate of interrelated information files supported by language and program facilities; the data can be used repeatedly for the information support of prescribed problems and informational-reference services for users. The data base is the basis of information support and is designed to store descriptions of indicators, ABD subscribers and their relations, quantitative values of indicators and various reference information.

Various holdings are included in the data base: information, catalogs, characteristics, data and reference.

Data base holdings are organized on 15 magnetic disk packs.

Information holdings are intended to describe the selected system of economic statistical indicators and the relations between them, as well as characteristics and normative provisions. The composition and content of informational holdings are determined with regard to the number of priority functional subsystems included in the

ABD and the composition of indicators for each of them. Indicators needed to solve union and republic level problems were taken into account in defining the list of indicators for the subsystems.

Indicators were selected based on analysis of dynamic series and indicators contained in statistical collections, prescribed and nonprescribed queries, as well as with regard to the needs of higher levels of the ASGS and other automated systems.

The informational holdings include 4,152 indicators: 602 for the industrial statistics functional subsystem, 2,039 for the agricultural, 471 for capital construction, 613 for material and equipment supply and 427 for budgets.

Catalog holdings are the aggregate of catalogs describing the relatively permanent properties of objects of observation and the relations between them. The most important of these is the catalog of subscribers, in which the characteristics of the subscribers and relations between them are described. The catalog is intended to describe the elementary and aggregated objects, data of which are accumulated or stored in the data base.

Elementary objects are enterprises, organizations, construction projects, builders, agricultural enterprises, population social groups and other primary objects of the various sectors of the national economy.

In forming the subscriber catalog, the principle of match of the degree of data aggregation was considered. Objects were aggregated by group features of unionwide classifiers (OKPO [unionwide classifer of enterprises and organizations], OKONKh [unionwide classifier of national economic sector], SOOGU [state managerial agency designations for the USSR and union republics], SOATO [unknown designation system]). It should be stressed that the BSSR TsSU RVTs ABD stores and processes data on almost 4,000 objects.

Subscribers for each functional subsystem are determined based on the needs of the state statistical agencies and other users.

The data holdings are the aggregate of data files stored in the data base with a common method of organization and description irrespective of program facilities. Data holdings are intended to store quantitative indicators described in the informational holdings for each ABD subscriber.

Data holdings contain long-term and current holdings and include data on 2,012 indicators. The long-term holdings include data on industrial statistics for four years (1975-1978), agricultural for 14 years (1965-1978), capital construction for 1940 and 1946 to 1978, personal budgets for 5 years (1970 and 1975 to 1978), and material and equipment supply statistics for 3 years (1976-1978).

Current holdings contain data for 1979 and quarterly data for 1980.

As reference information, the ABD uses unionwide classifiers and intrasystem reference files (directories of addresses, volumes, queries and others).

The user information language is built with a certain degree of formalization and is as close to natural language as possible. It has properties of unique description of the meaning of statistical indicators and is used as a tool to form data base holdings and to retrieve information in the files.

The documentation system for the first phase of the ABD includes: ABD forms intended for initial loading of the data base and updating it; documents for normative-reference information used in all ABD modes; query forms for user access to the system; output tables corresponding to query types--summary, data, characteristics, structure, dynamic series, grouping.

Output tables obtained from the ABD allow statisticians to access the ABD directly without having to resort to the intermediary of programmers for this. With that, statisticians are given not simply the values of the data queried by them from the ABD, but data already processed by using methods of mathematical statistics that have been edited and formatted into output tables that become the basis for in-depth analysis of particular economic processes and phenomena.

Tables for each type of query, at the user's option, may be output in profiles of a territory, sector and ministry or intersections of them.

The data base is formed, added to and updated by using forms for the informational holdings, the catalog of subscribers, data holdings and characteristic holdings. Normative-reference documentation in the ABD consists of unionwide and local classifiers that are used as the basis to form the data base. Output documents include standard output tables, documents on machine media, and check printouts produced in the process of processing information. File exchange is provided for to support other automated systems with information.

The BSSR TsSU ABD operates in the following modes: information-reference servicing, solving prescribed problems, data base maintenanace and update.

The information-reference servicing mode is intended for user access to the data base by using a query form or directly through a terminal to obtain needed information. This mode includes two main submodes: "Query-Response" and "Interaction."

In the submode "Query-Response," user queries may come in either directly on query forms and be processed in the batch mode, or through communication channels and be processed in the remote batch mode. In the submode "Interaction," the user has access to the ABD through terminals; the query is formed automatically by the computer based on the dialog between the user and the computer. Eight AP-64 terminals have been installed in the sector administrations and departments of the BSSR TsSU to realize the submode "Interaction."

The mode for solving prescribed problems of the first phase of the BSSR TsSU ABD realizes additions to the data base from the register of industrial enterprises. The update mode supports data base maintenance to keep it current for all its components (information holdings, catalog of subscribers, data holdings). "ISKHOD," developed by the USSR TsSU NII, is used as the data base management system.

COPYRIGHT: Izdatel'stvo "Finansy i statistika", 1981

8545
CSO: 1863/192

PROBLEMS OF IMPLEMENTING FULL MECHANIZATION OF ACCOUNTING

Moscow VESTNIK STATISTIKI in Russian No 5, May 81 pp 38-42

[Article by L. Polkovskiy]

[Text] The "Basic Directions for USSR Economic and Social Development for the Years 1981 to 1985 and for the Period up to 1990" call for increasing the quality and speed of accounting and statistics, improving accounting documentation and reporting in all elements of the national economy to meet today's requirements for managing, planning and analysis of economic activity with extensive use of electronic computers. In connection with this, it is necessary to expand the range of implementation of full mechanization and automation of accounting information in the enterprises of the various sectors of the national economy.

Let us list the main directions on which the solution to this problem large depend: the shift from individual design to more extensive development of interdepartmental and sector type designs of full mechanization of accounting and the "Accounting" subsystem in automated systems for management of enterprises; creation of standard design solutions for automation of accounting based on the latest computers and peripherals; development of methodological materials for organizing accounting under the conditions of automated systems for management of enterprises; improvement in the techniques for determining the economic effectiveness of introducing mechanization and automation of accounting in enterprises; development of cheaper computers and office equipment for installation of them directly at points of origin of data; development of progressive methods of organizing work on mechanization and automation of accounting in enterprises; improving the technology of computer data processing and the entire process of accounting-economic work in enterprises and organizations.

In addition, in the existing technology of mechanized solving of accounting problems, the following deficiencies have to be eliminated: the low degree of coverage by automation of the accounting process, which prevents eliminating manual labor; the large consumption of paper for manufacture of technical media; the lack of the capability to obtain results on-line with centralized data processing at regional computer installations; the laboriousness of delivering source documents by vehicles to computer installations from enterprises and back; the high cost of services by computer installations for processing source documents which is not offset by the savings from implementation of full mechanization of accounting; the diversity of types of computers put in computer installations; incompatibility of computers with respect to software, for the development of which many resources and much time are being spent.

In the existing designs for full mechanization of accounting, the technology of processing, as a rule, now ends with the output of analytic and synthetic registers, but the operations on compiling the reporting forms and tables for economic analysis, as well as obtaining reference information by query, are done manually at the enterprises.

At the enterprises in the sectors of the national economy, sections of accounting operations have been extensively mechanized, such as: labor and wages; truck operations; commodity-physical assets and sale of them. But the rates of implementation of full mechanization of accounting are not meeting today's demands. And meanwhile, it is quite obvious that only full mechanization of accounting is truly effective. Thus, with full mechanization, labor-intensiveness of manual operations is considerably reduced while productivity increases, which enables accounting workers to handle the continually increasing volume of information processing without proportional growth in strength. In addition, accounting is speeded up and report compilation time is reduced.

The USSR TsSU VGPTI [Central Statistical Administration All-Union Technological Design Institute] has made a specific effort to solve the questions raised on the implementation of full mechanization of accounting. Standard designs for full mechanization of accounting have now been developed that use punch computing machines and the M-5000 VK [computing complex] for industrial and agricultural enterprises, centralized accounting departments of institutions on the state budget and other organizations.

Availability of standard designs allows a significant reduction in outlays for implementation of mechanization and automation of accounting in specific enterprises.

The increase in quality of mechanized operations when standard design materials are used must also be considered. Thus, standard designs facilitate achieving a high level of mechanization and automation of accounting operations and of strict observance of operative provisions on the organization and methodology of accounting, and using progressive methods of accounting and the efficient technology of machine data processing.

To reduce outlays for implementation of full mechanization of accounting, the USSR TsSU VGPTI is continually working to improve the technology of processing source documents provided for in the standard design solutions. First of all, the data input and verification system for computer processing is being improved, assessment of statutory prices of source documents on wages and physical assets is being automated and the data coding procedure is being simplified.

The USSR TsSU VGPTI has now begun designing integrated systems to process accounting information at enterprises in the sectors of the national economy. The essence of these systems consists in merging the various accounting problems solved on the basis of the technology of data bases, uniform computer equipment and communication facilities into a single integral system.

These systems provide for: increasing the rate of exchange of information between the managing agencies and the managed facilities, eliminating repetitive duplication of accounting information and sharply reducing the labor-intensiveness of work involving calculations of analytic indicators and completing reporting forms. With that, data processing technology is being improved by standardizing the technological processes and procedures of conversion, full utilization of hardware, specialization of executives, rationalization of the data structure, and rational redistribution of functions among the workers in the administrative apparatus at an enterprise.

The designs for the systems of integrated processing of accounting information cover complexes of problems: operative-technical accounting and bookkeeping, operative-statistical and accounting reporting, economic analysis and monitoring. Creating systems for integrated processing of accounting information will raise multifold the efficiency of using computers in managing enterprises and organizations in the various sectors of the national economy.

However, it should be noted that standard designs for automation of accounting by applying YeS, SM and micro computers are not yet being developed with sufficient intensiveness. Thus, the development of the second version of the standard design solutions for the subsystem "Accounting" for machine-building enterprises based on the YeS computer will not be completed until 1982, while the standard design for automating accounting problems using SM and micro computers is still in the initial stage.

Practice shows that data processing outlays are reduced both as a consequence of using new technological methods and when the operating capabilities of electronic computers are improved. In the process, it is necessary to more actively introduce into the hardware complexes display and other peripheral equipment that allows getting rid of technical media (punch cards and tape), which will significantly reduce the labor-intensiveness of data processing.

The USSR TsSU VGPTI is now researching distributed computing systems (RVS). Development of them will require shifting to new progressive methods of processing accounting and economic information.

These systems are oriented to using microcomputers and miniperipherals which are characterized by high reliability and simplicity of interaction.

In using distributed systems for accounting, each worker in the accounting department (the number of which must be less than in the traditional accounting department) is allotted a microcomputer installed directly in the work place. In addition, all the microcomputers are connected together and form a common computing resource that can be used both for solving a large number of independent problems and for a single complicated problem.

By uniting on these same principles computer systems together by using prevailing communication channels (telephone, telegraph, radiorelay), a regional distributed computing system can be built to automate accounting within the limits of an administrative rayon. A regional distributed system may be the basis for building the lowest link in the state network of collective-use computing centers.

These systems are being developed by the USSR TsSU VGPTI for agricultural enterprises, centralized accounting departments of budget institutions, motor vehicle enterprises and other organizations.

To regulate efforts on the design of the "Accounting" subsystem, the VGPTI has begun development of sectorwide procedural guides (ORMM) for developing and implementing automated accounting in the ASU for industrial enterprises (associations) and developing a complex of standard program facilities for automating accounting problems based on modern computers.

The standard design developed on the base of the M-5000/5010 computing complexes will be of great value in the matter of expanding full mechanization in centralized accounting budget institutions. This design has now been implemented in the centralized accounting organizations for public health and education in Khimki and Babushkin, Moscow Oblast. In addition, the VGPTI has issued organizational and methodological materials for implementing full mechanization of accounting in centralized accounting budget organizations that specify the procedure for conducting preparatory work on correlating the standard design.

Starting in 1981, a new instruction is being put into effect to implement full mechanization of accounting simultaneously in all agricultural enterprises of an administrative rayon. This method of organizing work allows reducing the cost of correlating and implementing standard designs 2 to 2.5-fold compared to doing it individually on each farm.

Field supervision teams have been set up by the VGPTI to speed up assimilation of the new designs by the USSR TsSU computer centers and implementation of them in agricultural enterprises and centralized accounting departments.

Upon request from computing centers, these groups provide consultation, training of workers, and debugging and correction of working programs.

In the process of the field trips, the technology of processing accounting information imbedded in the standard designs is improved.

All changes (corrections) to the designs are sent by the field teams to all users.

The VGPTI plan of measures for the 11th Five-Year Plan calls for further improvement in the prevailing technology and organization of full mechanization of accounting. In particular, it is planned: to analyze existing designs for full mechanization of accounting in agricultural enterprises to find out the most efficient technology of processing information and implement it in the rayon computing installations of the USSR TsSU; to implement the second version of the standard design for full mechanization of accounting in agricultural enterprises on the M-5000 computing complex to reduce outlays for processing information; to improve the data input and checking system provided for in the standard design for full mechanization of accounting in centralized accounting budget institutions with the M-5000/5010 computing complex; to develop a program for automatic distribution of external storage with correlation of designs for full mechanization of accounting directly to a specific enterprise (organization); to improve standard designs for automation of accounting and reporting in agricultural enterprises and centralized accounting budget institutions by applying the M-5000/5010 computing complexes and YeS computers, using more modern technology for processing information; and to substantially improve the work of the field teams on standard designs for full mechanization of accounting in the USSR TsSU system.

To calculate the economic effectiveness of implementing mechanized accounting for clients, it is planned: to update the procedure for determining the economic effectiveness of implementing mechanized accounting at enterprises of the national economic sectors; to develop for the standard contract a corresponding form for calculation of the economic effectiveness of implementing designs for mechanized accounting for clients; to prepare proposals for development of instructions to sector ministries on the release of the number of accounting personnel in enterprises (organizations) as a result of implementation of full mechanization of accounting.

Successful completion of this work will largely facilitate raising the economic effectiveness of designing and implementing full mechanization of accounting in enterprises of the national economic sectors.

In the summary report by the CPSU Central Committee to the 26th party congress, General Secretary of the Central Committee L. I. Brezhnev said that each sector is faced with its own urgent tasks and specific problems, but that there are problems that embrace all spheres of the national economy. Full mechanization of accounting embraces all spheres of the national economy and, in the final analysis, promotes intensification of it and improvement of management.

COPYRIGHT: Izdatel'stvo "Finansy i statistika", 1981

8545
CSO: 1863/192

COMPUTERS IN INSTRUCTION

Moscow VESTNIK VYSSHEY SHKOLY in Russian No 4, Apr 81 pp 28-29

[Article by Professor G. K. Kruge and Docent G. Chkartishvili, Moscow Institute of Energy: "Substitutes for Algorithmic Languages"]

[Text] Experience has shown that incorporating computer methods and computers in the instructional process facilitates both the intensification and the modernization of educational activity. However, such results can only be attained through intensive, systematic efforts on the part of the instructors. Moreover, when one has access to powerful computer technology and is teaching students how to make use of this technology, one must always remember that this technology is only an auxiliary means for expanding our resources for training highly skilled specialists, and also that its use should not lead instructors and students away from the concrete (physical and engineering) fundamentals of their fields of study, but on the contrary, facilitate their study and understanding.

In our view, this latter issue is one of the main obstacles on the path toward incorporation of computer technology in the insrructional process. Let us consider the traditional method for solving school problems on a computer, where the lion's share of time is spent on the development and debugging of programs written in one of the general purpose high level languages. (Thus, the language must be known quite well.) This frequently overshadows the essence of the problem itself, not leaving the student time to grasp its meaning. And since the average user (especially the student and especially one not majoring in computer science) who as a rule is weak in his knowledge of the methodology and the programming language, he uses the computer complex irrationally, leading to a chronic shortage of machine time.

It is completely natural that these obstacles can be removed through the development and use of specialized languages and program packages, in other words, problem oriented programming systems which are as accessible as possible to the users and do not require knowledge of algorithmic languages.

The Department of Automation at our institute has acquired some experience in the creation of such languages, oriented toward the solution of problems in the analysis and synthesis of systems of equations of automation, i.e., machine analysis and synthesis of dynamic equations, the behavior of which is described by ordinary (linear and nonlinear) differential and partial differential equations with constant and variable parameters. Programming systems designed for minicomputers (M-6000, SM-3) for work in an interactive mode, as well as for the YeS (unified system) computer for the solution of problems in batch mode have been incorporated into educational practice. In essence, these programming systems represent packages of applied programs.

Currently we use two interactive systems--MASLIN (machine analysis and synthesis of systems in the frequency domain) and MASS (machine analysis and synthesis of linear and nonlinear systems in the temporal domain) in the instructional process.

The source language MASS allows a student to use a format which is easy for him to describe a model which he is studying, which is defined either by a flowchart or by a system of ordinary differential equations. The language includes a library of standard functions which make it possible to model transfer functions of dynamic networks, the more common statistical nonlinear characteristic curves, external effects (determinant, as well as random), arithmetic operations, elementary mathematical functions, and logical functions.

The topology of the modelled system is described by the structure operators, and the numerical values of its parameters by parameter operators. The design of the modelled system is accomplished by one of the numerical methods of integration, included in the library of procedures of numerical integration.

Variable models can be represented in the form of graphs on the screen of a graphic display, on a graph constructor, on a digital printing device, or in the form of a table.

The MASLIN modelling language consists in all of four elements: a dynamic network, an inverter, a connecting line and a symbol for extracting any of the above-mentioned elements.

With the help of the MASLIN programming system, one can analyze and synthesize linear systems, defined by a flowchart of any type with transfer functions between links given input variables determined. The program automatically transforms the flowcharts. Using MASLIN one can calculate and construct various frequency characteristic curves, the transient process and the radical travel time curve. Because of the library of optimal procedures which correspond to one of the criteria included in the system, it is possible to synthesize the connection feedback device. If necessary, it is possible to create ones own criteria in the form of a Fortran subroutine. In order to increase the number of students, doing their assignments on the computer we developed two systems based on the MASS and MASLIN interactive programming systems, designed for the Unified System Computer but operating in batch mode. For this purpose a special language was created for inputting the data and equations for the assignments consisting of key words used in the theory of automation equations.

A third package of applied programs which permits machine analyses and synthesis of systems of equations by the method of state space was also designed for the Unified Systems Computer. As is well known, this method is not used widely enough in the practice of design, although it is very effective. The input language of this system is a language of commands. Each command activates an earlier determined sequence of program modules, which perform one or another computational process.

One can use our system to verify the manageability and controllability of an assigned project when its base must be changed, to select a canonical representation or to isolate a subsystem which is being observed or controlled. Kalman's filter or Luenberg's identifier are used as the monitoring devices. The program makes it possible to synthesize output or state regulators, to control the modes of the system. One can select the method for solving Rikkati equations, determine the polarity of a closed system, or construct a process in the system.

Experience with use of the system has shown that, with its help, it is relatively easy (requiring 10-15 commands) to perform a complete synthesis and analysis of linear, multiply-connected systems of automated control.

For five years all these programming systems have been extensively used by our students for performing standard calculations, for class and thesis design project in courses in "Automated Control," "Design of Automation Devices and Systems," "Automated Design of Systems for Automated Control," and also in their scientific investigations. We have published instructional material and methodological manuals to help the students and instructors. These materials allow them to solve problems in the modelling, analysis and synthesis of automated control systems.

COPYRIGHT: Izdatel'stvo "Vysshaya shkola", "Vestnik vysshey shkoly", 1981

9285
CSO: 1863/198

COMPUTERS IN HIGHER EDUCATION

Moscow VESTNIK VYSSHEY SHKOLY in Russian No 4, Apr 81 pp 29-30

[Article by Professors A. A. Sasanov, V. F. Shan'gun, Moscow Institute of Electronic Technology: "With the Help of Shared Use Systems"]

[Text] One of the characteristic features of the scientific and technological revolution is the extensive incorporation of computer technology in scientific and engineering activity. The productive work of the modern engineer is unthinkable without the efficient use of computers. For this reason in many technical higher educational institutions, instruction in computer technology begins for students as early as their first semester. Thus, in our institute, there are lectures and laboratories in "Computer Technology in Engineering and Economic Design" (136 hours) for first year students in all departments, and in the second year instruction in this discipline is accomplished through course work. Then, in each semester all students use the computer for their course projects, their homework and their laboratory work.

With this organization of the educational process each student can be supplied with machine time only through intensive use of a computer with a well-developed direct access memory, a network of terminals, a time sharing regime, information banks, etc. This means that an important task is the creation in Vuz's of a system for shared use of the computer.

We have developed and incorporated for the students two interactive programming systems designed for shared use "Dialogue" and "Dislan," an interactive system for automated adoptive testing of the students' knowledge, "Akkord" and the "Oskar" teaching system. It is about these systems and our experience with their use that we want to speak.

The technological basis of all our systems consists of the YeS (Unified System) 1033 and 1022 computers with a central memory capacity of 256 k bytes, three YeS-5061 magnetic disk storage devices, connected to YeS-7906 display units with YeS-7066 alphanumeric displays. The software is the disk operating system for the Unified System series, including the base telecommunications method of access to the YeS Disk operating system (DOS).

The "Dialog" and "Dislan" systems of shared use, which differ somewhat in their functional possibilities, mutually complement each other and are designed to allow interaction among the working programs and their operational implementation in a batch processing mode with output of results on a printer as well as on the display screen.

We use the "Dialog" system basically for seminars and laboratories for learning programming languages (for example, in courses in "Computer Technology in Engineering and Economic Design" and "Algorithmic Languages"), and also in the solution of course problems in design. The total number of user stations (displays), offered by the system is 16. The system provides the opportunity for generating programs in all the programming languages resident in the YeS, DOS, and when the problems for assignments are being made up it allows any necessary connection to be made in them.

The total number of user stations in the "Dislan" system is 8, but the information processing power of each of these 8 displays is twice as high as it is in the "Dialog" displays. This is the reason for the additional capabilities of "Dislan," which are used for completing course and thesis projects and for the solution of problems being investigated by instructors as well as students.

The "Akkord" system is designed for automated adaptive testing of a student's knowledge through interaction with a computer equipped with displays. In one session, the system asks the student four methodically coordinated test questions. The first of these is selected by the system randomly from the whole set of questions on a given topic, the next three are contingent on the first. If the answer is correct on the first try the system displays on the screen the next test question; if the answer is incorrect, the student is given a second chance, but this lowers his grade. In the course of the examination the system provides feedback to the student on wrong answers, and at the end determines a grade and registers it on the display screen and on the printer.

Finally, the "Oskar" system provides programmed instruction for students in a variety of disciplines and can also be used for adaptive testing of knowledge. The system can be used simultaneously for 4 to 24 displays, and permits the creation, in the interactive mode, of a library for the course being taught. The library contains 197 sections, each of which includes up to 30 questions and answers. The structure of the relationships among the questions may be logical or arbitrarily determined by the instructor.

The process of instruction using "Oskar" is constructed as follows. On the screen the student reads texts, dealing with the material of the section of the course being taught, solves problems, etc. Here adaptive testing of mastery of the topic can be performed: the screen displays questions with their sequence and nature determined by the student's answers. The system has standard criteria for grades, which can be changed if necessary by the instructor, and also a block for statistical processing of the answers, which allow the instructor to be informed about wrong answers.

In concrete terms, how do we use all these systems?

Lower classmen work in the student computer room, equipped with a YeS-1033 computer and 16 displays. Here two systems for shared use are used--"Dialog," and "Dislan," and also the "Akkord" testing system. In the first semester of this school year, each student in the first three classes had 10 hours of display time. The "Dialog" system was used the most (77% of all display time). It was used for performance of scheduled laboratory assignments and "Dislan" was used by the students for independent study in higher mathematics, computational mathematics, theoretical physics, technological mechanics, electrotechnology, technology of instrument making, etc. The "Akkord" system is used mainly by the departments of Engineering Graphics, Physical Chemistry, Organization of Production, etc.

Students in their fourth to sixth years work mainly in the computer center, which is equipped with two computers of the type YeS-1022 and 16 displays. Here they use the "Dislan" system and the "Oskar" teaching and testing system. "Dislan" is used most of all by the graduate departments and "Oskar" by the foreign language department, computer technology, etc.

Of course, the creation of systems and the development of teaching and executive programs for them required and still requires expenditure of labor and time. Thus, the creation of the "Dialog" system took 24 man months, "Dislan" -- 20, "Akkord" --12 and "Oskar" -- 20 man months. Instructors, engineers and upperclass students participated in this enterprise.

The experiences we have accumulated in designing and using interactive systems for shared use made it possible to begin to develop a system for shared use which is integrated in its functional capabilities. By uniting the functions of the separate subsystems used in the educational process, this system makes it possible to significantly lower the unproductive expenditure of display and machine time, lower reaction time to user requests and simplify the work of maintenance personnel. Within the framework of the design of an integrated system, we envisage the creation of an intermachine computer complex based on the YeS and SM (International System of Small Computers) computers. A rational organization of communicational capacities in conjunction with the possibilities of intermachine exchange makes it possible to increase the throughput capacity and reliability of computer resources. This is extremely important when these resources are put to operational use in the educational process.

COPYRIGHT: Izdatel'stvo "Vysshaya shkola", "Vestnik vysshey shkoly", 1981

9285
CSO: 1863/198

LATVIAN ASU

Riga SOVETSKAYA LATVIYA in Russian 11 Apr 81 p 2

[Article by K. Kovalenko: "Electronic Control Unit"]

[Text] This idea was born within the walls of the Scientific-Research Institute for Planning of the Latvian SSR Gosplan several years ago. More than a little effort was expended by the specialists of different organizations of the republic to bring it to life. And now recently it has come to pass. In Riga, they have put into use the main computer center for shared use, designed to operate a republic automated system of control. The center (GVTS) has at its disposal a system of automated data banks (ABD) which contain all the information necessary for planning and control of industrial production, capital construction, housing and municipal services and other sectors of the republic's economy.

The information of the automated banks are accessible to various organs of control. Today the services of the GVTS are used by Gosplan of the republic and more than one hundred different ministries and departments. In 1980 it was used to develop a design for a five-year-plan of industrial production by 33 ministries and departments and the republic as a whole.

"The expediency of this approach to the creation of an automated system of control is discussed in the resolutions of the 26th CPSU Congress" comments the director of the NII (Scientific-Research Institute) for Economic Sciences, E. Ya. Sture. One of the sectors "Fundamental trends in economic and social development of the USSR from 1981-1985 and in the period before 1990" indicated the necessity for providing for further development and increased effectiveness of the network of automated systems of control and computer centers for shared use, continuing to unite them into a single, statewide system for the collection and processing of information for recording, planning and control. Our republic has taken an active part in the performance of this task."

The computer complex for shared use made it possible to shorten the time needed to construct the plan for economic and social development of the republic for the 11th Five-Year Plan, and to develop several variants of it.

9285
CSO: 1863/193

COMPUTATIONAL LINGUISTICS IN ESTONIA

Moscow PRAVDA in Russian 17 Apr 81 p 3

[Article by D. Klenskiy: "The Computer Edits"]

[Text] A sector for computational linguistics was established in the Institute of Language and Literature of the Academy of Science of the Estonian SSR. The appearance of "electronic" divisions in institutions where philologists work surprises only the uninitiated. The stimulus for this was the recent mass compilation of every conceivable type of dictionary.

From the very beginning the idea seemed seductive--explained the director of the Institute E. Sygel'--to create a "data bank" based on all dictionaries previously published in Estonia, and then to let computer technology select everything necessary for the compilation of narrower, more specialized dictionaries.

This work is going on at full force at the Institute. It promises much savings of time and effort. For example, the computer-aided compilation of an orthographic dictionary on an unabbreviated form with 100 thousand words took a fraction of the time it ordinarily would, even though one worker rather than five worked on the mini-dictionary. With computer aid, we have already prepared the first volumes of a Russian-Estonian dictionary, an explanatory dictionary of the Estonian language and work on dictionaries of Estonia dialects and the Vodsky language. The latter is especially interesting. At the present time approximately 30 people speak this language in the Leningrad Oblast'. But for experts in Finno-Ugric it has a value, similar to that of Sanskrit for the understanding of the Indo-European linguistic family.

The use of computer technology opens up a wide range of possibilities for the compilation not only of dictionaries but of encyclopedias. It is true that for this the machine must have a knowledge of grammar and the ability to analyze texts. Programs written by philologists who are also electronic specialists help here. In the Institute, an encyclopedic dictionary for young people has passed through the "expertise" of the computer. The publishing of historical and geographic dictionaries are also being considered.

Computer knowledge of the structure of language is indispensable in the development of dictionaries, particularly reverse ones where words are arranged in alphabetical order but from the end. Ordinary direct dictionaries give information about the semantic aspects of words, and reverse ones the grammatical aspects. This is why they can be used to find, for example, adjectives based on "y," beginning with different letters of the alphabet. Does this sound capricious? Maybe so, but in philologists' work such reference handbooks are a great help.

The preparation of dictionaries and handbooks with computers as co-authors is only one direction in the quest of the workers of the sector of computational linguistics.

Another, no less interesting subject was discussed by the head of the sector, Deputy Director M. Remmel': The computer opens up enormous prospects in typography. With the proper program technology can be given the task of putting a text into the desired format, for example, newspaper columns or pages of a book. The same is true of selection of type face. The computer itself proofreads the text against the original, and changes it at an operator's command. In other words, it fulfills the function not only of a proofreader but of an editor.

At the "Valgus" press they cited the following example for me. Last year, they received an order from the GAI (State Motor Vehicle Inspection) of the Estonian SSR to print new "Traffic Rules." The material had to be translated from Estonian and printed. The philologists were given this task. They input the "raw" text into the computer, the machine prepared it for printing and furthermore edited it. All this in the shortest possible time. As a memento of this task M. Remmel' keeps the pamphlet which bears the following notation on its title page: "This text was set at the Institute of Language and Literature of the Academy of Science of the Estonian SSR.

More than once the linguists helped the Republic's newspapers. As is well known, the material which comes over the TASS teletypes must be proofread, in particular letters in the text must be capitalized. The computer took over this task making it possible to expedite the publication of important news. Electronic technology successfully passed a test during the 26th CPSU Congress. With the help of the computers, the Republic accepted and published the proceedings of the Congress.

I sit with M. Remmel' in one of the "electronic" rooms. On the screen, similar to a television, a text was being displayed. My companion demonstrated how to make corrections and transfer the command directly to the printer. In essence, he acts as editor, typesetter and compositor. After he has finished with it the text goes directly to the photosetter and then through the whole process up to preparation of the matrix, from which, through an offset process, copies for publishing newspapers, magazines and books are printed.

Next to the display I see the text of "Major Directions" passed by the 26th CPSU Congress. My companion opens it to the right page. The lines about the latest systems for information processing and about the development of the phototelegraphic method for transmitting newspaper pages have been underlined in red pencil. He continues:

In our country, research is being conducted on how to obtain matrices with the help of laser rays, without using expensive photographic material. This is still in the future. But what we are working on now is in the mainstream of the task, proposed in the 11th Five-Year Plan.

[illegible]

COMPUTERS IN RURAL CONSTRUCTION

Riga NAUKA I TEKHNIKA in Russian No 5, May 81 p 4

[Article by I. Rutens: "First Set of 'Raskheg' Programs"]

[Text] Several years ago when the "Latgiprosel'stroy" Institute for Designing Rural Construction began to develop plans for rural gasification, it took two years to create the first plan for the Dobel'sk Rayon. Then an algorithm and special program for the "Minsk-32" computer were created in the institute and in 1978 plans for gasifying two rayons were completed. But even this level of methodology and technology of design was considered inadequate in "Latgiprosel'stroy". For this reason, specialists in the creative group undertook to develop a general-purpose antuomated gasification plans based on the "Nairi-K" digital computer. Thus, in 1979 a set of programs called "Raskheg-79" standing for "The Derivation Gasification Plans," appeared. With its help, last year, ten designs of plans for gasifying rural rayons, towns, settlements and farms of the Latvian SSR were developed. The use of the "Raskheg" program set made it possible to fully automate the computational part of gas supply projects.

"Raskheg" consists of three programs:

(1) Calculation of the hourly and yearly gas usage of individual establishments or whole systems of establishments;

(2) Calculation of hydraulic characteristics of systems of gas use;

(3) Calculation of technological and economic indices of gasification plans.

Blind alley systems of gas pipelines with significant fluctuations in gas pressure are amenable to hydraulic calculation. It is possible to calculate a variant where new systems are connected to pipeline segments which are already in operational use. With the help of the program it is possible to select the most economical diameter of pipe for each segment, taking into account loss of pressure and expenditure of gas. This makes it possible to reduce capital expenditure on building by an average of 5% and expenditure of metal by 7%.

The technological economic characteristics of the plan include length and mass of gas pipelines, the cost of labor for laying them, the cost of the system as a whole including capital investments and cost of use.

Each of the three programs can be used alone, but when they are used in combination the results of one is used as the input data for the next.

In the future the "Nairi-4/ARM" digital computer will be used for designing plans for gasification, this will make it possible to automate the whole design process.

The Latvian Republic's Board of NTO (Scientific Technical Society) for the Oil and Gas Industry submitted the "Raskheg-79" program set to the All-Union Review of the Best Proposals for fuel and energy economy and raw material resources.

COPYRIGHT: Izdatel'stvo TsK KP Latvii, "Nauka i tekhnika", 1981

9285
CSO: 1863/193

USE OF AUTOMATED SYSTEMS IN MARITIME TRANSPORTATION

Moscow MORSKOY FLOT in Russian No 4, Apr 81 pp 15-16

[Article by V. Bondarenko, chief of the Main Computer Center of the Ministry of the Maritime Fleet, candidate of technical sciences: "The Maritime Fleet ASU — Problems and Solutions"]

[Excerpt] The common goal of the production activity of maritime transportation is to satisfy the needs of the economy and population for maritime shipping as fully as possible. It is obvious that this can be broken down into large subgoals, and then into narrower and more particular ones: in the field of shipping — fulfillment of plans for coastwise and import-export shipping; in the field of use of the fleet — reducing in-ballast trips and dock downtime, improving use of the technical capabilities of the ships, and reducing general ship expenditures and expenditures while anchored in port; in the field of port operations — reducing expenditures for cargo-handling and auxiliary operations and raising their productivity, reducing the storage time and improving the preservation of cargo, and improving the use of port resources; in the field of ship repair — improving the technical-operating characteristics of the ships being repaired, reducing expenditures for ship repair, cutting repair time, and improving the use of ship repair resources.

It takes a uniform system of compatible indicators to assess the degree of achievement of the goals. These indicators could act as criteria of the quality of management at the sectorial and production levels.

One of the main directions of work to develop and improve the efficiency of ASU's [automated control systems] remains the incorporation and hardware realization of new management problems. At the same time the accent should be shifted to problems based on optimization techniques in order to bring production processes closer to extremum regimes, raise the return on capital, minimize expenditure of resources, and reduce the time required to fulfill plan assignments. Despite the significant theoretical backlog in this area and many operational experiments that have been made by the collectives of enterprises, scientific research institutes, and higher educational institutions on the initiative of A. Sazonov, L. Gas'kov, E. Gromovoy, V. Levyy, B. Roginskiy, and others, mathematical economic methods still are not widely used at maritime transportation enterprises.

Third-generation computers are used chiefly for "first-generation" problems: accounting, monitoring, and analysis. Many problems of optimizing technical and technological decisions, plans, and schedules have remained "problem-oriented" and "experimental for many years. Of course, there are many difficulties in introducing mathematical economic methods in practical work by the fleet, ports, and ship repair yards. They are the low precision, incompleteness, diffusion, and highly dynamic character of the raw data, the large dimensions of the problems, and the lack of ready-to-use software adequate to solve the problems.

The development of optimization procedures which can be built into models of continuous operational planning and management is particularly pressing because integration of these models is the chief way to improve the operations activities of maritime transportation.

Development of a scientific methodology for mutually coordinated operational, annual, and long-range planning based on an automated system for shaping and managing the normative base is an important problem. It is important in light of the demands for further improvement in the country's economic mechanism and in connection with work that is being done to set up automated systems of planning calculations. The complexity of the problem lies in the need to take account of a large number of fast-changing conditions while keeping a certain stability in the norms themselves.

In recent years the techniques of future planning, which determine the choice of the best development strategies for planning, have not received adequate attention. Imperfect methodology and failure to take complete account of trends, interrelationships, and constraints lead in many cases to incorrect estimates of the rates and proportions of development of maritime transportation, even though the information capabilities and hardware of the automated control systems make it possible today to carry on systems research based on variation of conditions and raw data and consideration of a large number of world and national economic factors. With a serious approach such projects have a high level of both scientific objectivity and persuasiveness, which is important for defending them at state planning bodies. Future planning models cannot be considered and discussed apart from models of annual and operational planning. The way to improving planning is to make the transition from short- to long-term models and from local to sectorial models by successive incrementation and integration by stages.

The automated control systems now receive many millions of characters of production-economic data each day. Some of this data is not used at all. But at the same time there is very important information which has not yet been organized, is not regularly fed into the automated control system, and is not integrated and analyzed at the highest management level. Some examples are cargo in ports with opened or unopened letters of credit, goods that have not been inspected for defects by commodity inspectors, goods that are in storage for less and more than the normative period, and so on. Therefore, one of the important jobs of the developers of automated control systems is to substantiate the data infrastructure. The complexity and volume of information are growing much faster than production volume. In general, however, management workers are not asking for more information; they are asking for better information, more appropriate to the jobs they are doing. For this reason it is necessary to carefully substantiate the content and structure of information flows and files. Considering that the volume of information affects the cost and quality of operation of automated control systems and the speed of solving management problems, especially with active regimes of computer-user interaction, the developers of automated control systems must find answers to many questions, such as: What kind of information is needed at the given level of control? Should it be generated immediately or prepared in advance? Where and how should it be formed and stored? What is the most efficient way to transmit it? How can it be verified?

In the last 10-15 years the density of writing data on magnetic media has increased almost 100 times and the cost of storage has been cut 1,000 times. Program complexes have been set up in our country that control the input, correction, and receipt of data. This makes it possible to design and shape powerful data bases that are capable of serving many users in a centralized fashion and can be a data source for many control programs. Designing these bases is a complex and labor-intensive task.

Economic substantitation of the choice of objects, processes, and means of automation and technical and technological concepts is an essential condition for rational development and raising the efficiency of automated control systems. Unfortunately, we did not give this proper attention earlier, and this led to inadequately efficient use of computers, software, and specialists and retarded the rate of growth of the overall economic impact from the use of computer technology. Considering the significant scope of work and substantial capital and operating expenditures in the 11th Five-Year Plan, plans for scientific and planning work and programs for development of the technical base of automated control systems should rely on the technical-economic substantiations and decisions of the Scientific-Technical Council of the Ministry of the Maritime Fleet and the technical councils of the enterprises and organizations, not on the arbitrary demands of various officials.

Forming an information-computing network in the sector to raise the level of automation and reduce costs associated with data collection, transmission, and processing is a promising line of work. The network should, of course, be formed as a part of the nationwide automated control system and correspond to its general goals and standards while also meeting the requirements of maritime transportation as fully as possible. To accomplish this many questions must be answered: What kind of topology should it have? What is the best way to organize interaction among computers? How can we predict the behavior of the system and define its development as the workload grows? The network should meet most of the demands of users with respect to time of receiving information, cost, reliability, security, and the like.

An important task of the current five-year plan will be organizing interaction of the maritime automated control system with the automated control systems of rail transportation, foreign trade, and other departments. Solving this problem will make it possible to improve operational planning and regulation of shipping and will be very important for coordinating the work of the entire USSR transportation system.

The last decade has seen broad penetration of computers into the sphere of scientific research and planning-design work. This has made it possible to implement the comprehensive systems engineering approach in solving many engineering-technical and economic problems and to speed up the production of practical recommendations. Computers allow us to process the results of economic modeling and engineering-physical experiments in real time, investigate probablistic factors, and process enormous volumes of raw data. The research conducted at scientific organizations in recent years has increasingly relied on the hardware, information base, and software of the automated control systems, which eliminates duplication of work in data collection, frees scientific workers from many routine operations, accelerates scientific studies, and raises their efficiency. But the use of computer technology at the institutes is still inadequate. They are still significantly behind the needs of production, especially with respect to the development and incorporation of decision-making techniques in the ongoing operations situation, that is, techniques for realizing optimal plans. Whereas optimal planning by mathematical economic modeling techniques has been fairly well studied everywhere, the use of operational decision-making techniques based on simulation models that synthesize formal and informal procedures for analyzing the situation is limited to the comparatively narrow experience of the Odessa Institute of Maritime Fleet Engineers. Simulation models today are quite complex and large program units whose development could be carried out by the departments of our higher educational institutions.

The material base of the automated control system, especially telecommunications and terminal equipment and data transmission means, will be further developed in the coming five-year plan. Semiconductor technology has reached a high level of development today, and the designs of equipment are becoming more complex. Incorporation and full use of the hardware of automated control systems is becoming one of the problems that must be resolved in the process of designing and operating these systems.

The sectorial fund of algorithms and programs and the center for managing classifiers of technical-economic information need improvement. A great deal must still be done to organize the work of the services of the automated control systems (set up at the information-computer centers of the Baltic Steamship Line, the Port of Leningrad, and the Il'ichevsk Ship Repair Yard) for assembling and managing the systems and applied programs for the automated control systems "Steamship Line," "Port," and "Ship Repair Yard." When national economic planning tasks were transferred to computers it became necessary to set up a sectorial center to manage technical-economic norms and standards.

Organizational questions are within the jurisdiction of the Department of Automated Control Systems of the Ministry of the Maritime Fleet, from which we would like to see a greater contribution in the 11th Five-Year Plan.

COPYRIGHT: "MORSKOY FLOT" 1981

[illegible]

[illegible] 1829/[illegible]

ACADEMICIAN VIKTOR GLUSHKOV ON STATE OF THE ART; MICROCOMPUTERS

Kiev LITERATURNA UKRAYINA in Ukrainian 1 May 81 p 2

[Interview with Academician Viktor Glushkov by correspondent Mykola Pavlenko at the Order of Lenin Institute of Cybernetics, Ukrainian Academy of Sciences, date and place not specified: "The Talent of an 'Intelligent' Machine"]

[Text] I wander the known and unknown world of cybernetics. There, at the Order of Lenin Institute of Cybernetics of the Ukrainian Academy of Sciences, where many eminent scientists are working with Hero of Socialist Labor, Lenin Prize Laureate, Academician Viktor Mikhaylovich Glushkov, many theoretical questions are being solved and intelligent machines and systems are being created.

As soon as I crossed the threshold on the way to the computer center of the institute I encountered a "Pal'ma."

"What information are you interested in?" the machine asked me. "In which area are you a specialist?"

"Pardon me, I am a journalist and am interested in you."

"My name is Pal'ma."

"You have a pretty name."

"Thanks for the compliment, but I am only an information retrieval system. I help specialists of various areas of the national economy to process and gather to the fullest extent certain information. My users have spent at least 30 percent of their working time on such work."

"Please tell me your characteristics."

"Firstly, I am composed of computers of the YeS series--high-performance machines. Secondly, information is input without preliminary processing, in the language of the original, and thirdly, if my research files do not contain documents you specify, then I will select the materials you need by association."

"What plans do you have?"

"In the near future I will retrieve information automatically! And in the long term we will unite into a single state network which will make it possible to obtain informational documents and materials in any corner of the country."

I thanked the machine for the complete reply and directed myself toward the reception room of the director, where a meeting with V. M. Glushkov had been arranged for me.

Businesslike Comfort

[Question] "Viktor Mikhaylovich! What will the plant of tomorrow be like?"

[Answer] "The basis of production will be new automated lines formed on the basis of shops with programmed control. Our industry is already producing them. Such shops have well recommended themselves and their production is increasing with each year. Obeying instructions and recordings on punched or magnetic tape, the machine itself processes a part, changes the working conditions and controls the tool. But the main advantage of such equipment here is that, if a completely different part must be made, it is unnecessary to re-equip the shop and it suffices to insert a tape with a different program."

Both the shops and lines of which the scientist speaks already exist. But they are still a novelty—a unique beginning, the start of a new path. But in the future equipping of plants such arrangements will become the basis of machine building.

If Viktor Mikhaylovich has to determine a figure more exactly, he does not scan a writing pad. He simply presses the key of a display standing on the right side of his desk, and the green lines which run on the screen are formed into the needed table. The computer is like an outstanding worker: it answers at once and does not trouble itself with deliberations. It is skilful and positive and, mainly, it saves what a manager has the greatest shortage of, time.

The display in the office of the director of the Institute of Cybernetics is rational to the smallest detail and the furnishings are arranged for maximum businesslike comfort quite organically and intelligently, with multicolored telephones and a calendar on a small table.

[Answer] "The time is approaching when the computer will be an everyday working tool for each scientist. Today we are creating automated systems for the control of enterprises, sectors and entire rayons. The computer helps physicians make diagnoses, regulates the movement of transport flows, lays the course for a nuclear-powered vessel in the Arctic Ocean and processes the results of sports contests. It is an ordinary object of our scientific and technical way of life.

"But what is the explanation for such a rapid, if it can be expressed that way, impetuous advance of cybernetic equipment that we have today? To reply briefly, the demands of scientific and technical progress, the complexity of those national economic problems which face mankind and, in addition, those advantages which electronic helpers provide to people.

"I will try to explain this by an example. Everyone knows that today a large enterprise has hundreds of suppliers, tens of shops and a very large list of products parts. With ordinary non-machine methods it is difficult, and sometimes even impossible, for people to compile an optimum 24-hour plan every day at such an enterprise. But with the help of computers in a well-organized system it is possible to plan by the year and by the minute.

"To do that it is necessary that production information from each technological section and from each working place be constantly at hand at the computer center of the enterprise. And a plan only becomes real if it is particularized and reduced to each worker. And that is not simple at all. Try to reconcile or, as it seems to me, synchronize the production plan of one's own section with the plans of an adjacent section. We have finished with those complex tasks, having created a system by means of which tasks are being successfully compiled for each worker at a number of enterprises. These are above all our first-born of automation, the L'vov Production Association 'Elektron.' A so-called information conveyor has been introduced there for the first time.

"We are not talking about an ordinary conveyor, it is clear. During a time of great increase of labor productivity it already slows down production today. For such a conveyor is built for the 'average' worker and does not take into account the psycho-physiological features of highly qualified people, whose labor productivity can hold back a fellow-worker. Here there arose the idea of an information conveyor."

[Question] "What does that mean?"

[Answer] "A shop, a machine, a mechanism laid out separately, working places not connected by a traditional conveyor. But the computer prepares in advance for each work place a plan in which everything is calculated by the minute and by the year. Such an information conveyor, developed for the galvanizing shop of one of the Kiev plants, increased labor productivity by 70 percent. And, take note, this was without any sort of additional production equipment, and only thanks to proper regulation of the flows of parts and working processes which the computer calculated. But a plan is a plan. It must be constantly monitored and corrections must be effectively introduced, that is, it requires effective intervention, which is unthinkable without feedback. Consequently, the computer had to be connnected with each working place."

BAMS (Basic Apparatus for System Development) Which Understands Everything

[Question] "Viktor Mikhaylovich! It seems to me the simplest way would be to extend a cable from the computer to each workplace. Although then, perhaps, the entire plant would be converted into a gigantic tree enclosed by an infinite garland of wires."

[Answer] "The people who created the L'vov machines until recently could not readily maintain relations with their offspring. It is paradoxical but a fact that it proved incomparably simpler to construct the machine than to operate it. In order to come to an understanding with the machine it is necessary to compile a huge complex of instructions for it (a machine language), to learn programming languages, etc. This is why in creating BAMS, the basic apparatus for systems development, the scientists took into account the psychology of the people who will operate it and who, possibly, have not seen and have had nothing to do with such instruments. The scientists started from the fact that this system has the same simplicity of operation as a telephone or television set. Press a button and the necessary information appears on the screen. In that case human psychology and its individual characteristics are taken into account. Let us say, one works with graphs, another likes graphic material, and a third--literature and digital information. The screen illuminates the information in green, and in case of absence of information, a black background forms. In addition, it was necessary that any sort of equipment be simply attached to the system without additional difficulty and that it be convenient to work with it.

"BARS is a multilevel hierarchic system. On the lowest level, at the workplace, an instrument is installed which resembles a small panel with knobs. By pressing on them the worker gives information about what is being produced at his place. Let us say, a part or tool is lacking. He can request that the rate of work be increased or decreased. It suffices to press certain buttons and the necessary information is transmitted very completely.

"The BARS system not only affects the management of production but also accomplishes monitoring. With its help it is possible to examine production not only in the final stage but also in each production operation or after the conclusion of an entire group of such operations. This is an absolutely new level in the organization of control, since the BARS permits organically uniting control of the technology with control of production as a whole.

"The BARS also has demand abroad. In particular, the People's Republic of Bulgaria has acquired a license for the series production of this system. And the BARS won the highest award, a gold medal, at the Leipzig Fair.

"The BARS system, developed by scientists of our institute, is accessible to any sort of enterprise. It contributes to bringing control of technology close to control of the economy. In this, properly speaking, is also concealed the success of cybernetics and automation in the national economy which was discussed at the 26th CPSU Congress."

Microcomputers on the Conveyor...

[Question]"Tell me, please, about the very interesting work of the laboratory collective headed by Doctor of Technical Sciences Aleksandr Pasagin."

[Answer] "The main goal of the collective is to develop and introduce microprocessor technology. The transition to a new elementary base--large-scale integration--makes it possible to make microcomputers the size of a cigar box or even smaller. This collective, with the Leningrad "Svetlana" Association, has already created an entire family of the first Soviet microcomputers. The saving from their introduction will amount to over 90 million rubles.

"The so-called modular-unit principle of design of computer hardware, developed by the computer scientists, opens up new possibilities for the creation of measurement, diagnostic and technological apparatus and means of communication.

"The laboratory scientists, together with the specialists of the Kiev Production Association imeni Korol'yev and the L'vov Production Association imeni V. I. Lenin, were awarded a 1980 Leninist Komsomol Prize in the area of science and technology for a cycle of work on the development and introduction of computer hardware into production. The cybernetic technology developed by them has no foreign analogs and the basic technical solutions match the world standards.

"It is the dream of the collective to create untraditional computational structures. So-called recursive structures composed of thousands of microcomputers also are promising. They assure multichannel, parallel, rapid and reliable information processing. A high-capacity computer microprocessor created together with the country's electronic industry will perform 100 million operations per second."

[Question] "Viktor Mikhaylovich, the piano is an excellent musical instrument, but not everyone is able to play it. The quality of performance depends on the qualifications and talent of the performer..."

[Answer] "It's the same with a computer. The higher the programmer's qualifications and talent, the greater the possibilities of the computer...

"From automation of programming, which gave a very great gain to the national economy, a real jump was made to automation of planning. You probably have heard the expression, "The computer is planning computers"? Usually people do the planning, but that expression contains a portion of truth. Here is an example: the planning of a processor, the most important part of a computer, previously took a team of 10 men 2 years. Now, by means of a system of automation of unit planning, it is possible to create the design of a new processor in 15 days."

[Question] "What are the main features of machines of the near future?"

[Answer] "For computer users the new leap in the productivity of the machines is the most important. The computation rate will increase from 10-20 million operations per second in the most rapid machines of the third generation to hundreds of millions and, possibly, several billions of operations per second. The memory content will also increase correspondingly. There will be a reduction in the cost of a machine operation, computer reliability will increase, and connections of man and machines will be simplified, especially during the solution of tasks in the conversion of literary and graphic information.

"Real progress has been noted in microminiaturization and integration, and this contributes to an increase of computer speed and reliability and makes it possible to create complex 'intelligent' and inexpensive machines. The total memory content of large fourth-generation machines will amount to several millions of 500-page volumes. A total of several tens of such machines will be able to store the most perfect data (down to the finest details) about the economy of any of the largest countries of the world.

"Another kind of new computer is the talking, or linguistic, machine. The idea of creating them is based on the conversion of symbolic 'structures,' of which formalized languages are formed, into real circuits. Then the machine will directly understand people. And this brings the creation of artificial intelligence closer.

"Directly dependent on the progress of artificial intelligence is increase of the effectiveness of automated control systems and systems of automated planning and research and also of many other systems. 'Intelligent' machines will enhance the intellectual capacity of people and accelerate our movement along the path of scientific, technical and social progress.

AUTOMATED OIL PIPELINE TRANSPORT CONTROL SYSTEM

Moscow PROMYSHLENNYY TRANSPORT in Russian No 3, Mar 81 p 22

[Article by V. Z. Andreyev and V. F. Kravchenko]

> [Text] An exhibit covering the development and implementation of the automated oil transport control system--the ASU transneft'--was set up at the USSR VDNKh [Exhibition of the Achievements of the National Economy] at the end of last year.

In the USSR, oil and petroleum products are conveyed by all the basic forms of transportation. But the role of pipelines is especially significant in transporting oil: About 85 percent of all oil extracted enters the main pipelines. By the end of 1980, there were about 76,000 kilometers of main pipelines in the country for oil and petroleum products. An exhibit covering the development and implementation of the automated oil transport control system--the ASU-transneft'--was set up at the USSR VDNKh at the end of last year.

The ASU-transneft' is a major part of the automated petroleum industry control system (ASU-neft') and is linked directly to the subsystem for organization and control of oil production. In them, data is exchanged on the availability of oil reserves, oil pumped out, capacity available and in use in the buffer reservoirs, and the qualitative characteristics of the oil. A modern hardware complex is used to acquire, monitor, process and output the results of problems solved to system users. The ASU-transneft' has three levels of control. As a rule, economic and organizational problems are solved on the two upper levels. At 11 administrations for main oil pipelines, information and computing centers have been established that are equipped with the YeS-1022 and YeS-1010 computers and YeSTEL-2 data teleprocessing systems. Data is acquired, prepared and transmitted over telephone lines by using YeS 8501 terminals installed in the regional oil pipeline administrations.

The upper-level ASU's perform such major functions as expeditious dispatcher control of the oil pipeline network, technical and economic planning, analysis of economic activity, management of centralized maintenance and repair, accounting and reporting, management of material and equipment supply and others. It should be noted that functional efficiency of the ASU-transneft' is achieved primarily due to the automated process control systems (ASUTP) for pumping oil through the main pipelines; this is a qualitatively new advancement in the ways and means of controlling the complex distributed objects of the oil pipelines. The automated process control systems take care of the major functions of starting and stopping the pipelines, changing the pumping conditions and preventing emergency situations.

The work "Development and Implementation in the National Economy of the Base ASUTP on the Mozyr'-Brody-Uzhgorod Oil Pipeline" was nominated for the UkSSR State Prize.

Automated process control systems have been installed on such major main lines as the Ust'-Balyk--Kurgan--Ufa--Al'met'yevsk, the Nizhnevartovsk-Kurgan-Kuybyshev and the Kuybyshev-Unecha. Work is underway on the chief sections of the Surgut-Polotsk oil pipeline. In the current five-year plan, 160 oil transfer stations and 54 reservoir parks have been automated, 330 pump stations and 4,630 km of the linear part of the oil pipelines have been telemechanized.

In the Administration for the Northwestern Main Oil Pipelines, the first ASUTP operating in the control mode was placed in service for the 110th anniversary of V. I. Lenin's birth. The dispatcher for the Al'met'yevsk-Kuybyshev oil pipeline brings it up to specified throughput by pressing a button for 35 minutes. One to two hours are required for this on other main lines.

The economic effect from introducing the automated process control system on the Al'met'yevsk-Kuybyshev oil pipeline is estimated at 895,000 rubles. The information-control mode will be installed in all automated process control systems for main oil pipelines.

The total economic effect from introduction of the ASU-transneft' in the 10th Five-Year Plan was 21.67 million rubles.

COPYRIGHT: Izdatel'stvo "Transport" "Promyshlennyy transport", 1981

8545
CSO: 1863/214

BRIEFS

COMPUTERS AND CONCRETE--A high quality concrete mixture is guaranteed at the Baku plant for ferroconcrete products No 4. The amounts of cement, gravel, and other components of the mixture are determined by a computer. This increases the quality of the finished product, and makes it possible to avoid unproductive waste of materials. The computer keeps strict track of the progress of the manufacturing process and gives essential information to the enterprise's dispatcher. A display permits the dispatcher to have a real effect on the production process, and to introduce corrections at any stage of it. Automated control of concrete mixture is only one of the tasks introduced into the plant by the ASU (Automated System of Control) for manufacturing processes of production of ferroconcrete products. The ASU also handles the progress of work report on raw materials, controls the work of the concrete batch and molding shops, provides statistical control of strength and homogeneity of concrete, etc. It was concluded that the incorporation of only the primary ASU--MP into the plant for ferroconcrete products will produce a saving of more than 300 million rubles. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 9 May 81 p 2] 9285

MISSING PARTS--Dear "Komsomolka"! We, the Komsomol members and young specialists of the information-processing-computer center of the newest commercial port in our country--Vostochnyy, are writing to you. As you know, this port is being built in one of the bays near the city of Nakhodka by young builders. By now we have already received practically all the necessary equipment and software devices, only a few things are missing--two magnetic tape storage units--UVMPL SM 5301/10. According to contract we were supposed to be supplied with these by the Odessa computer plant. But the Ministry of Instrumentmaking, Automation Devices and Systems of Control of the USSR has nullified this contract, alluding to the overcommitment of its plants. As a result our computer has remained out of commission. Help us, "Komsomolka," put us in touch with the young people and komsomol members of those enterprises in our country where they manufacture the equipment we need. It cannot be that no one will answer our plea to "breathe life" into our computer. Ours is a common cause, involving the good of the state. [Text] [Moscow KOMSOMOL'SKAYA PRAVDA in Russian 14 Apr 81 p 2] 9285

CSO: 1863/193

END

END OF FICHE

DATE FILMED

Sept. 29, 1981

[redacted]